MODERN PLASTICS

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APRIL 1939

VOLUME 16 NUMBER 8

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Cover Color this month STARLIGHT YELLOW (Created by Textile Color Card Association)

M A Y

Plastics have found unique opportunities of expressing their decorative qualities under the expert guidance of decorators and designers both at the Golden Gate International Exposition and the New York World's Fair. In our May issue we expect to point out some of the more striking uses of these materials. Ethel Lewis, A. I. D., will describe those she saw on her recent visit to the Coast and George S. Albee will reveal the result of his observations at Flushing Meadows.

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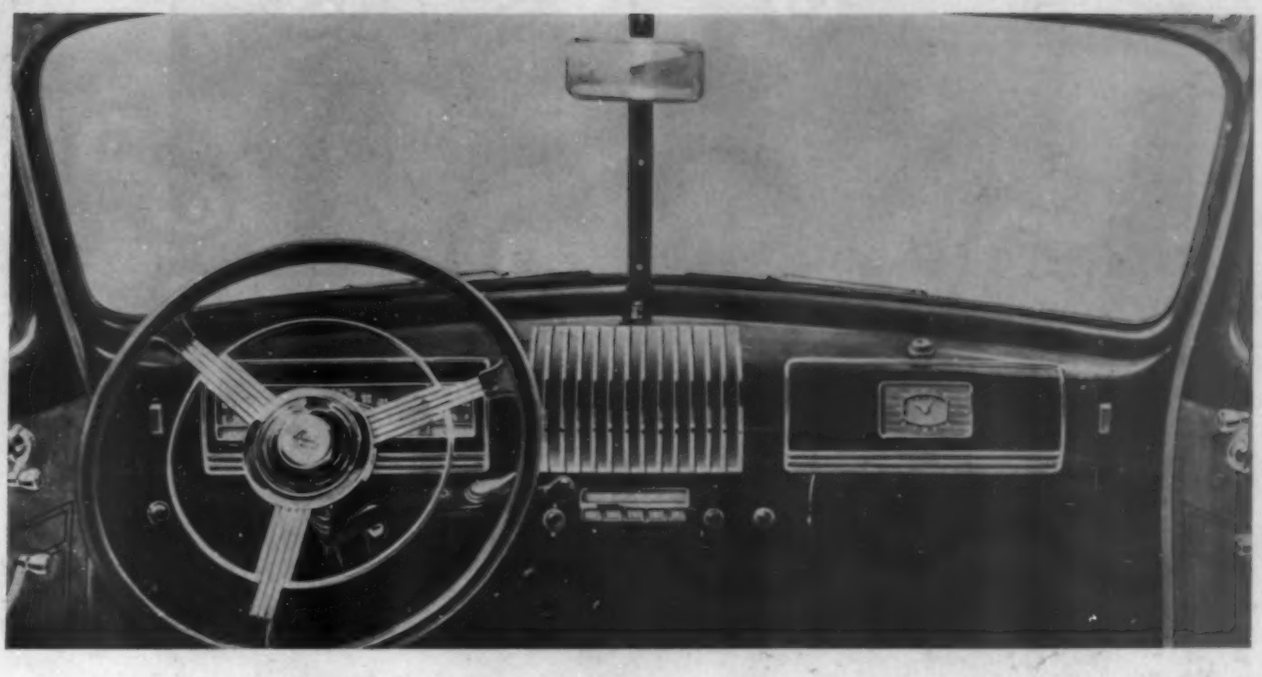

This interior of the new Buick exemplifies the smart modern design typical of all 1939 cars. Its steering wheel of course is plastic as are control knobs and window-lift handles. (Photo courtesy Celluloid Corp.)

AUTOMOBILES OF 1939

by WILLIAM T. CRUSE
CELLULOID CORPORATION

Safety and improved design are key notes of this year's cars

THE SCENE OF MOTORDOM'S competitive struggle having been removed from the race track and with the horsepower tug of war playing a diminishing role, there now come forward two contenders, style and safety, upon whose shoulders the sales battle of the future will be waged.

The time was, and memory need not be strained, when all automobile engineering was devoted to the premises of speed and horsepower. The success of this program is recorded by impressive sales history. But speed and power eventually ran their course—the season arrived when sales curves wouldn't respond to more miles per hour or increased power.

At this point the industry turned to emphasizing and developing style and safety. Engineering departments were augmented by stylists, styling divisions were created, industrial designers were welcomed and a more active participation in safety activity was encouraged.

Into this fresh original approach, into this modern styled automobile, plastics fit with exceptional qualifications. While certain plastics had been adopted earlier by the industry these applications were essentially functional, such as phenolic timing gears and distributor housings or as transparent nitrate sheet stock for side curtains. The designers appreciating the variety of colors available in plastics, the warmth of their touch and the variety of their forms used them to impart these features.

Initially the applications were on smaller interior hardware parts. Now they are used on major interior pieces and exterior uses are being developed.

Examining some of the parts the first to receive notice and one of the earlier uses is door hardware, knobs and escutcheons. These, if their color is bright are cellulose acetate molded, otherwise they may be phenol formalde-

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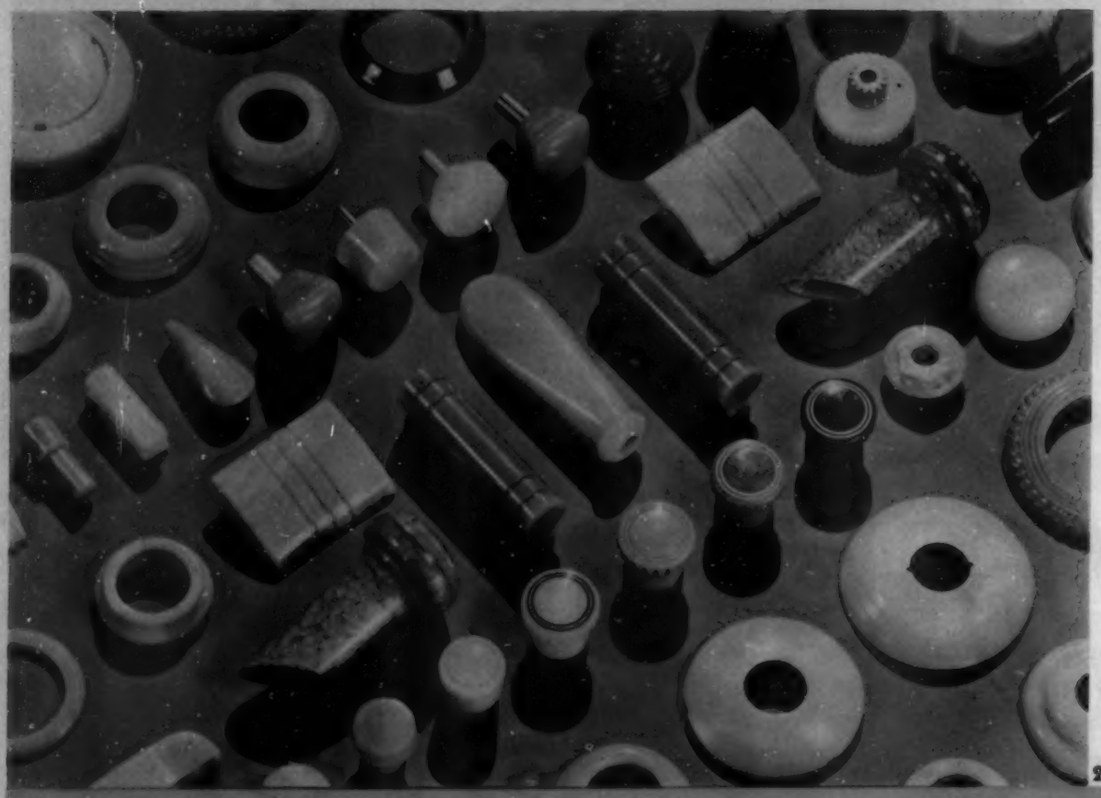

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The pearl effect in the Packard instrument panel (Fig. 1) could be obtained only by using plastic material. Fig. 2—A variety of molded acetate parts. Chevrolet gear shift knob (Fig. 3) is injection molded in two parts which fit over a rubber core. Fig. 4. Acetate knobs as they come from the press. Those in front show metal inserts already attached. Individual designs of banjo-type safety wheels are pictured in Fig. 5. The Nash horn button (Fig. 6) is molded of transparent material. The Chevrolet radio grille (Fig. 7) is one of several comparatively large parts injection molded for the 1939 cars. (Photos courtesy Tennessee Eastman Corp.)

hyde. Plastic knobs and escutcheons have supplanted die-cast or stamped chrome-plated metal. In addition to being of equivalent or less cost to manufacture, they are used for their superior touch appeal and their appropriate color quality. With the plastic hardware, tones and shades of color are in range to match any upholstery or trim. Today an automobile instrument panel without plastic controls needs modernizing. It is possible with molded control knobs and covers to engineer types which facilitate their operation by including certain grip designs. The function of the control can be named by molding in the appropriate designation such as lights, throttle or light switch. By using a simple color wiping process two colors are readily attainable. Because of its high tensile strength and rugged toughness for this vital work cellulose acetate material is generally employed.

There is no more prominent application of molded plastics on the modern car than the banjo-type safety steering wheel. First wood then rubber bid for this task. Wood had its shortcomings. When accidents happened it splintered. It wouldn't flex nor bend. Rubber possessed these qualities. It lacked inherent color—this was supplied by varied coating processes. It was a step forward. It failed in its permanence and depth-shade. Rubber wheels once worn bare of their coating gave off lamp black to soil gloves or clothing which was contacted. Cellulose acetate plastics surmounted these objections. To the safety wheel it lent strength with resilience, yet, under measured stresses would yield; to the wheel finish it assured permanence for the color was an incorporated part, to the style, whatever color shade desired with any depth of tone preferred.

The translucent dome lights and the rear compartment reading lights are of compression molded translucent ivory urea formaldehyde plastics. These materials are of identical character to the reflectors found in a molded office or home standard fixture. The switches which control these lights are a molded plastic.

In the current models unique among the new developments are glove box doors and instrument panels of

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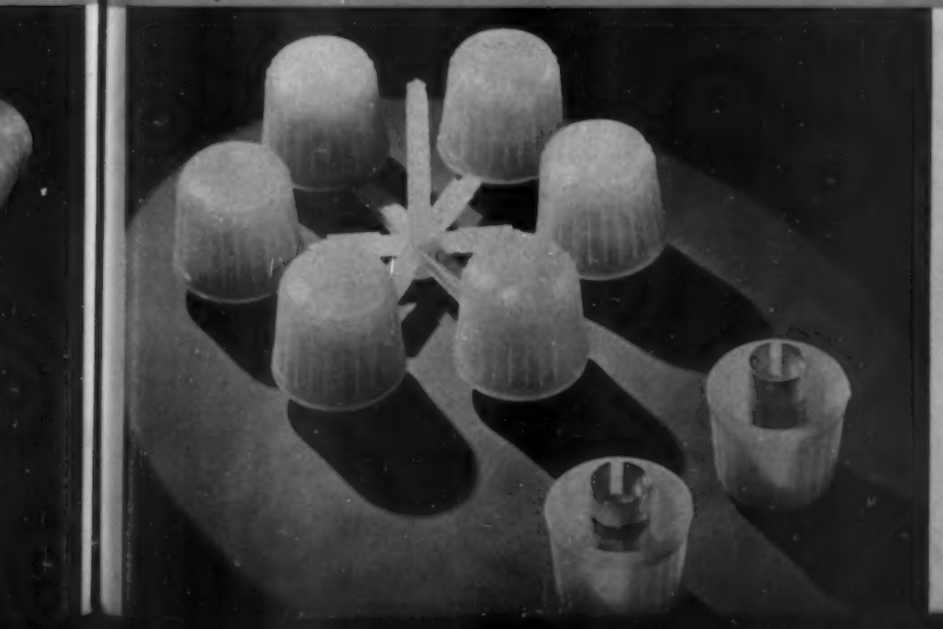

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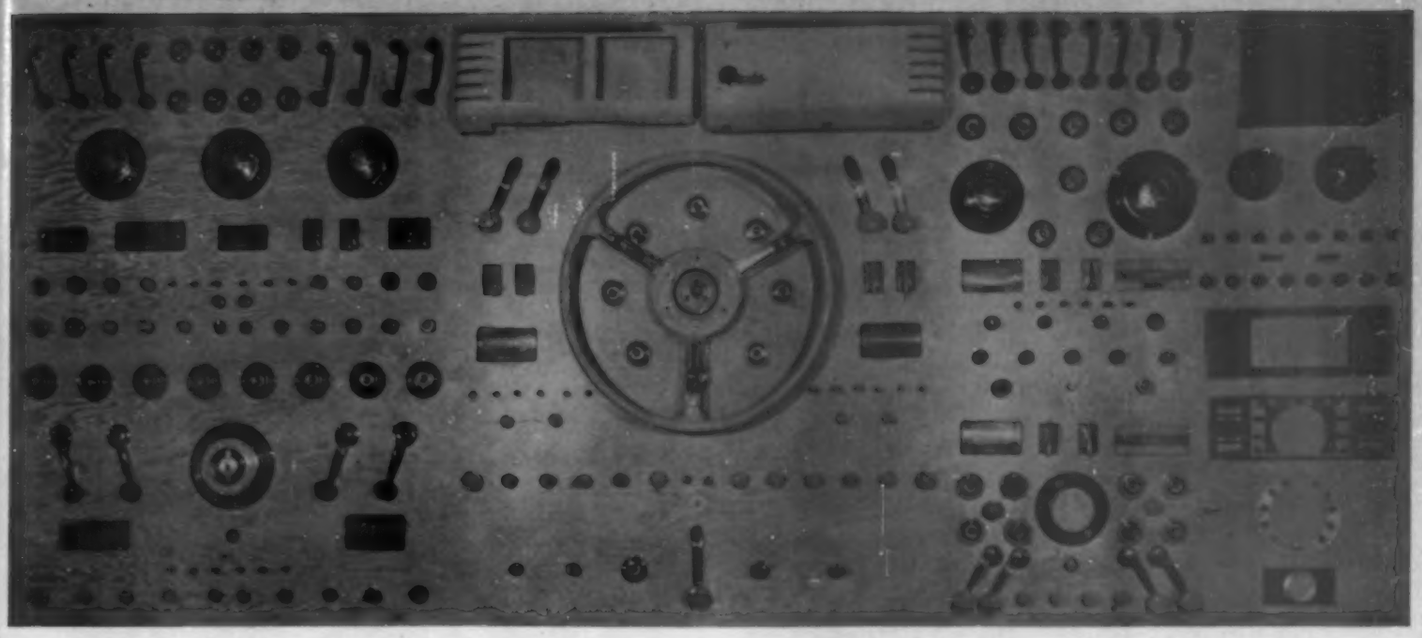
Display board prepared by Chrysler Corp. to show plastic decorative parts used in the 1939 Plymouth line appears above. At the top of the opposite page, display panel showing plastic parts in this year's Chrysler cars

molded synthetic materials. The Chrysler glove box door marks a distinct innovation in construction. Where stamped metal formerly served, style was accentuated and utility improved by using a plastic over metal.

Packard, who a few years ago considered plastics suitable only for cheaper cars, has equipped its de luxe model (to be exhibited at the New York World's Fair) with plastic door knobs, door locks, window lifts, steering wheel, gear shift knob, ventilator lifting knob, side lights and an instrument panel with a pearl effect which plastic alone could give, running the full width of the car. The clock and speedometer have three plastic rings around the outside. The first is a plain ring of cellulose acetate; the center ring is transparent acrylic resin with numerals on the back; the top ring matches the panel and has openings through which the numerals of the instrument may be seen.

Hudson, in addition to conventional applications, employs a transparent acrylic panel through which the driver can observe speed, fuel, temperature, generator



behavior, oil and a clock. Letters are molded into the rear of the panel, which would not be practical were glass used for this part.

Hupmobile has a radiator ornament with a cast resin strip inserted in chrome. Window lifts and door openers are metal, entirely covered with plastic, with knobs of the same color. Steering wheel and almost the entire instrument panel are of plastics with control knobs and ash tray handles. The horn button is molded in maroon to match. The Skylark model seems to prefer metal and no plastics appear except as radio controls.

Graham has employed an interesting striated effect, easily obtainable in acetate materials, for their instrument panel which includes clock, speedometer and radio grille. Cellulose acetate molded panels are inserted in escutcheon plates to match upholstery and, of course, the steering wheel and gear shift knob are of the same material. Metal door handles, window lifts and horn button are used for contrast.

Nash is among the first to make use of the new transparent polystyrene plastic in place of glass in the instrument panel. The oblong speedometer is covered by the practically unbreakable material and another strip below, permits a clear view of amperage, oil, temperature, fuel and mileage indicators. Letters and numerals are molded into the material at the back. An enormous horn button of transparent material with the Nash logotype molded beneath and filled in with red is striking indeed. Plastic knobs are used as controls on the "conditioned air" unit, ash trays, hand throttle, rheostat, cigaret lighter and lighting switch. Large comfortable knobs of plastic material used for window lifts and escutcheons are especially well designed.

Studebaker's President model has a transparent acrylic instrument panel which takes advantage of the edge-lighting properties of the material to illuminate the indicators. Gold numerals are molded and filled in the face of the clock at the back so the surface is flush. The horn button is plastic with metal nameplate inserted. Gear shift knob to match. Window lifts are metal with metal escutcheons. Another new model employs acetate over a metal core for door lifts but with metal knobs.

De Soto has a glove compartment door and instrument panel decorated with cloisonne beneath glass. This cloisonne is accomplished by hot pressing sheet plastic material of various colors or plain. The center panel of the steering wheel is decorated with the same material.

Dodge takes advantage of plastic color in some fifteen knobs besides steering wheel, door escutcheons and decorative knob on radio antenna. (*Please turn to page 76*)

Distributor caps from many makes of cars are shown at the left below. They are molded from phenol formaldehyde compounds as are the rotor arms, spark plug hoods, stop light switch parts which connect with hydraulic brake system, and other small parts shown at the right. (Photos courtesy General Plastics, Inc.)

SAFE DRIVING AT NIGHT

From England comes an opportunity for automobile manufacturers to rid headlights from dangerous glare

CONRAYS, LTD., OF LONDON, HAS DEVISED A radically new lens for automobile headlamps which appears to be a striking advance in promoting safe driving at night. The device is made up of hexagonal tapered cones (Fig. 4) with compensating and locking pieces (Fig. 5) which drop loosely in kaleidoscopic pattern into a specially shaped lens (Figs. 6-7) where they are firmly locked together by a rubber washer and metal clip. This unit fits into the rim of existing motor car headlamps, replacing the usual glass lens and is kept in position by the ordinary spring clip ring. They can be placed in a few seconds without special equipment on British cars but information is lacking at the moment as to whether or not they are designed to fit American cars.

The cones and compensating parts are molded of water-clear polystyrene resins and highly polished. The optical properties of the material, thus scientifically designed and applied, are made to control refractions of the light beam to avoid all glare. The toughness of the material and its resilience assure nonbreakage of the parts from the normal shock of driving and permit their complete lock-up so they will stay put.

Conray's Anti-dazzle unit provides ample light for safe driving as shown in Fig. 1. The Dunlop sign is one hundred yards ahead of the car. Fig. 2—Shows the glare from common headlights recorded by the camera as compared to the complete absence of glare when headlamps equipped with the anti-dazzle unit (Fig. 3) are photographed from the same position

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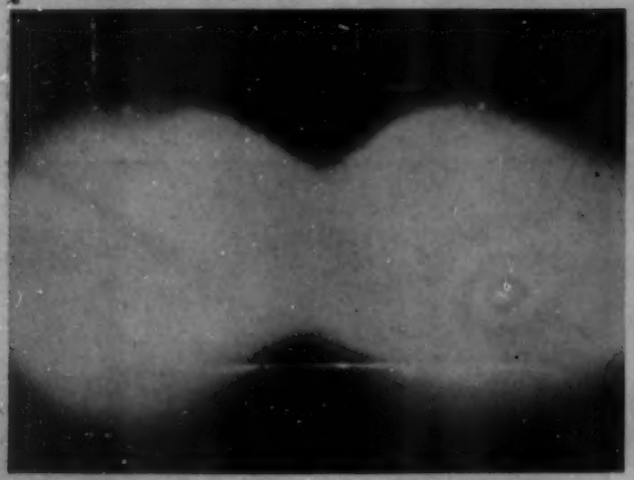

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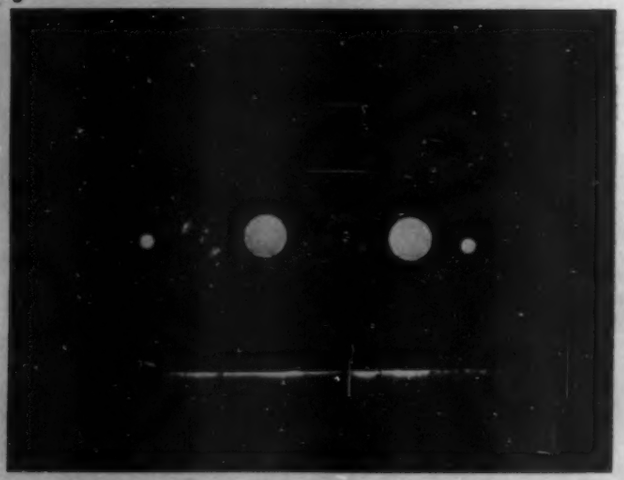

The result of this scientific instrument is obtained by control of the dazzling rays at their source. Through the medium of the transparent hexagonal tapered polystyrene cones which are placed at such an angle as to produce a compound multiple reflection of the rays, the direction of these rays is completely controlled so that no glare exists.

There is no sacrifice of headlamp efficiency through such control. This may be clearly seen in Fig. 1 which shows the illumination from headlamps fitted with Conray's Anti-dazzle device as viewed from the driver's seat. The Dunlop sign which is clearly visible, is one hundred yards from the front of the car. Notice how effectively the left side of the roadway is lighted. A pedestrian or bicycle could be seen plainly ahead. The car, of course, is being driven at the left of the road since the photograph was made in England.

Complete absence of glare is indicated in Fig. 3 which shows the reaction of the camera to these lenses as contrasted to its reaction to ordinary lenses fitted in the same headlamps, illustrated in Fig. 2. Such lenses obviate the necessity of dimmers and dipping devices on the highway and provide the driver with constant light so he can see the side of the road a sufficient distance ahead. They could be used in metropolitan areas which now frequently require dimmers by law, with the result that driving in poorly illuminated side streets is a constant menace both to drivers and to those on foot.

The unfortunate part is that fitting your car with the anti-dazzle lenses will not prevent the glare in your own eyes from the other fellow's car, but if American automobile manufacturers find this, or a similar device, practical and adopt it as standard equipment on all cars, night driving will become infinitely more safe.

State regulations could quickly abolish the old glare-producing lens as they have abolished the danger from ordinary glass as wind-shield material, demanding safety glass in its place.

It is generally conceded that most night accidents occur because the driver of one car is blinded by glare from the approaching headlights of another car to such an extent that he cannot see the edge of the road nor pedestrians walking in front of him. With this danger removed, accidents would be left almost entirely in the hands of those who sleep at the wheel or who are artificially accelerated by a mixture of alcohol and gasoline.

The Conray Anti-dazzle device is fully protected by patents in England and abroad. Conrays Overseas Syndicate, Ltd., is arranging foreign rights by way of assigning patents or granting manufacturing licenses as the conditions demand.

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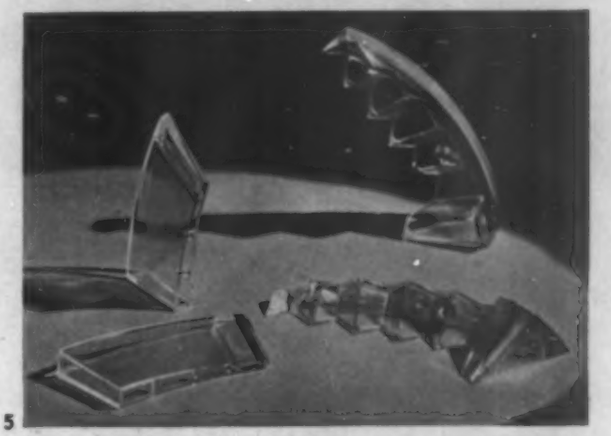

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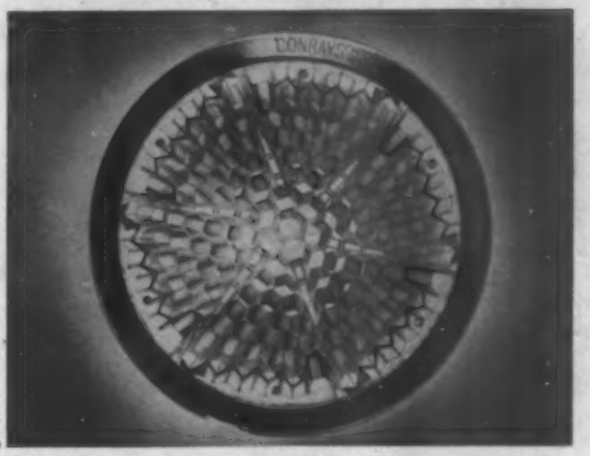

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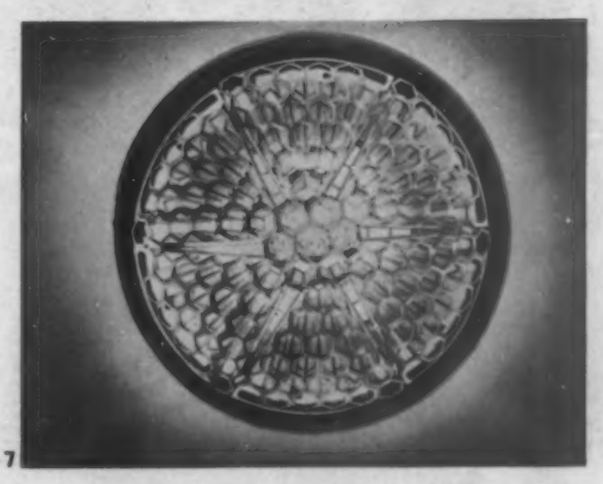

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Hexagonal tapered cones (Fig. 4) are assembled with compensating and locking pieces (Fig. 5) which drop loosely into a specially shaped lens where they are firmly locked together by a rubber washer and metal clip. Fig. 6—Shows the inside of the lens after assembly. Fig. 7—Shows the front. Cones, locking parts and compensating pieces are molded of polystyrene, then highly polished. The assembled unit fits into the rim of existing motor car headlamps on British cars

CONGRESSIONAL

FOUR HUNDRED AND FIFTY MILES OF laminated plastic shelves provide space for ten million volumes in the new Annex of the Congressional Library in Washington, D. C. Counter tops, desk tops, delivery tables, baseboards, push plates, kick plates, card file drawer fronts, are also surfaced with plastic so they will endure.

Gray green Morocco finish was chosen and where panels appear, an aluminum trim is used. Baseboards and chair rails are black. Real wood, impregnated and laminated with a plastic surface is used for the tops of tables and desks so they will withstand the constant abrasion of daily use. Private offices and public rooms have chair rails of this sturdy, lasting and decorative material.

Telephone booths, inside and outside, are laminated phenolic material backed with a plywood core but so constructed that the plywood is entirely sealed within the plastic lamination.

Probably the most modern and most efficient library building in the world, the Annex is completely air-conditioned throughout.

Figs. 1-2 illustrate the light spacious quarters devoted to operating offices. The Main Reading Room (Fig. 3) shows the delivery desk at the rear which is completely made of laminated material with inlaid panels. Shelving behind the desk and the high paneling above are all laminated as are the tops of the reading tables. Another reading room is illustrated in Fig. 4

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LIBRARY ANNEX

where shelf to ceiling paneling is set in place and completely outlined with aluminum trim.

Fig. 5—shows two of the telephone booths off the Study Room corridors with paneling, shelves, seats and base of laminated material. Panels are 11/32 in. thick hardboard Morocco finish. Base is black with wood backing. Shelves and seats are of veneered construction with smooth dull finish. One hundred and eighty-two Study Rooms are available to accredited readers who may have a room set aside for their individual use for a period of two weeks where they can do research and writing. These rooms open off paneled corridors, one of which is shown in Fig. 6. These laminated panels are about 16 in. wide separated with metal trim and fastened to metal grounds. The base is black, the panels are gray green.

A section of the Index Room is shown in Fig. 7 where 15,000 card file drawer fronts are made from solid urea sheet machined to size. Fig. 8—illustrates still another reading room where laminated plastics have been used to the best advantage for decorative, protective effects.

Pierson & Wilson, architects collaborating with David Lynn, architect of the Capitol, have clearly demonstrated the practicability of plastics for interior construction. The gratifying result is a true challenge to those who are commissioned to build for permanence. (All photographs, courtesy Formica Insulation Company.)

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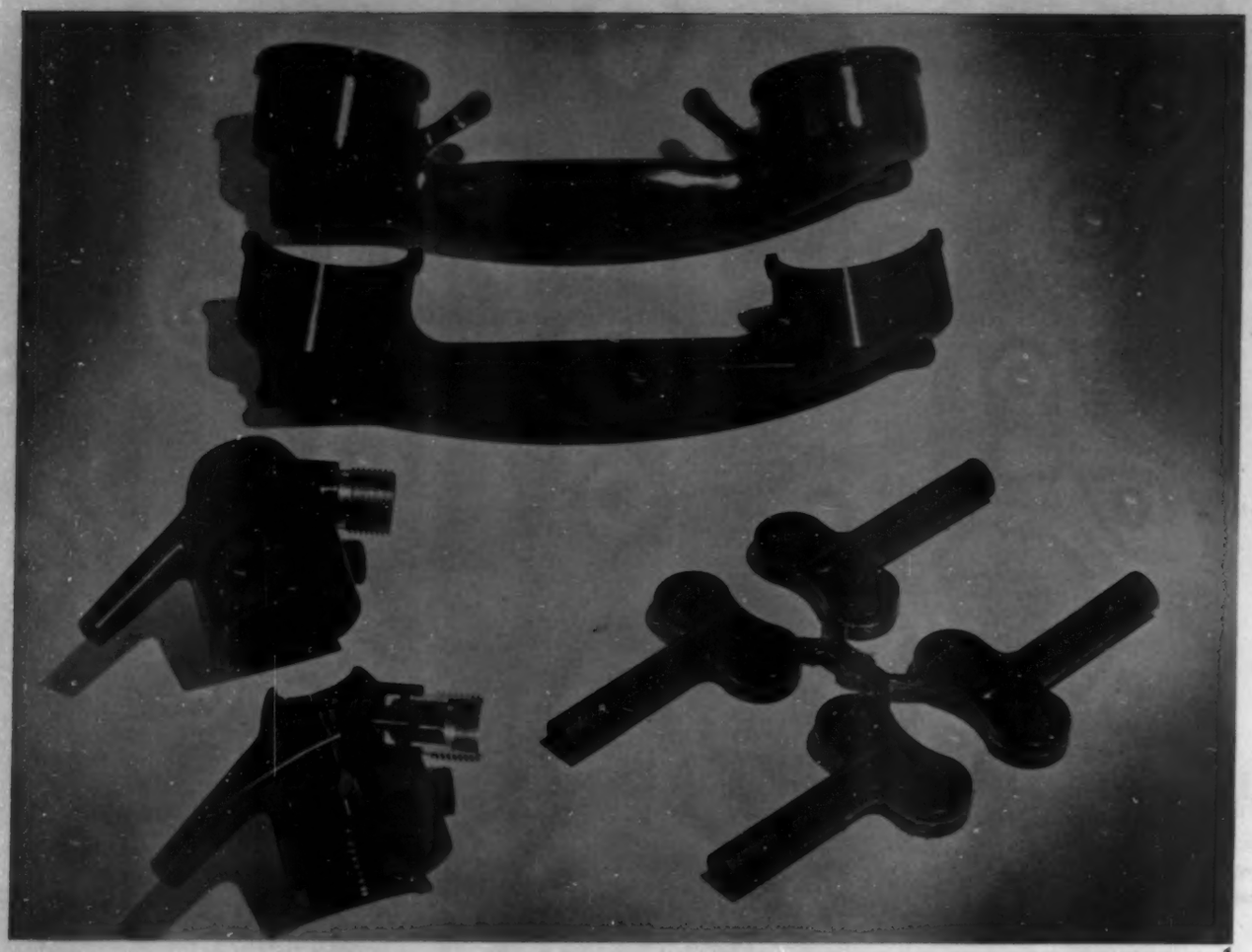

Fig. 1—Telephone hand set (top) is molded in one piece with open channel for wire connection between the two ends. Cut-away section appears below. Lower left: Syphon head for rechargeable soda bottle showing inserts and cut-away section. Lower right: Watchman's winding key molded from impact material—four at a time—from a single gate. (All photos Shaw Insulator Company)

1

TRANSFER MOLDING

This method of handling thermosetting materials will bear watching during coming months

THE BEST INDICATION OF THE VIRILITY OF ANY industry is the rapid adoption of more efficient equipment, processes and materials. The prompt acceptance of Injection Molding of thermoplastic materials offers ample evidence that the molding industry is ever alert and now that this process is thoroughly established, interest is rapidly turning to *transfer molding* of thermosetting plastics. This process provides the advantages of injection molding plus the superior characteristics of heat-hardening materials.

In anticipation of this trend, material manufacturers will shortly announce new thermosetting plastics that have been developed exclusively for transfer molding. These materials will be available in a wide variety of non-fading colors, including white and pastel shades.

Although the industry is familiar with transfer molding, increasing interest and the development of new materials makes it advisable to present certain facts that may not be generally known. The process of transfer molding (covered by United States patents), differs from injection molding and extrusion molding.

Injection molding is defined as a process whereby thermoplastic materials are forced from a heated receptacle into a mold cavity of lower temperature. When the composition in the mold has cooled sufficiently to be rigid, the molded article is removed. An analogy of injection molding in another field is the linotype machine.

Extrusion molding is defined as a procedure whereby heat-softening materials such as rubber, cellulose acetate, pyroxylin or shellac are forced through an orifice to

produce shapes of uniform cross section, such as rods, tubes, sheets, etc., in continuous length. Phenolics have been extruded this way in Germany but not commercially yet in America.

Transfer molding is a process whereby thermosetting materials such as phenolic or other heat-hardening resins are preheated to the flowing but not to the curing point, and then forced into closed mold cavities where they are held under additional heat and pressure until curing has been completed.

Commercial production, totaling millions of parts, furnishes definite evidence that transfer molding provides a practical means for molding high-impact materials—parts with large area necessitating long flow in molds—intricate shapes or parts requiring accurately placed or fragile inserts—reduction of weight by adequate coring—molding over or coating metal castings—use of low cost brass or other soft metal molds for preliminary production when large volume is not assured—greatly increased mold life because of elimination of abrasive action that occurs when molding compounds are introduced directly into mold cavity—substantial reduction of finishing costs. In explanation of these statements, the following should be considered:

As the molding material has been preheated to the point where reaction is about to take place, or has actually started before entering the mold, the cavity is filled in a minimum time. (*Please turn to page 74*)

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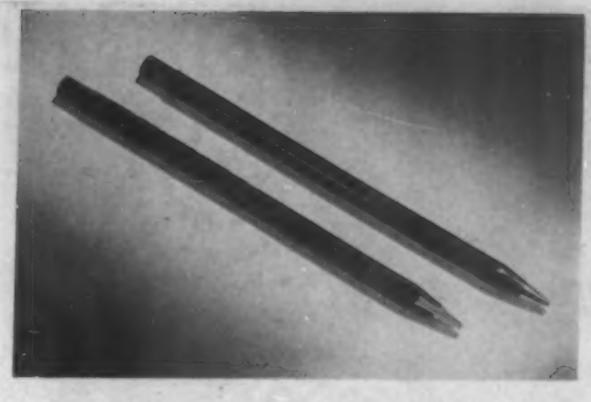

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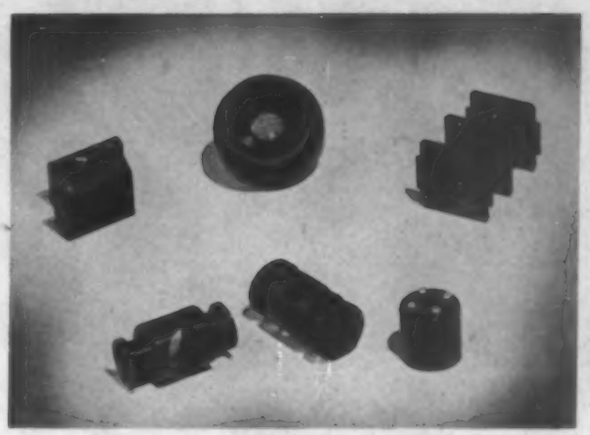

Fig. 2.—Pencil with propeller screw molded in. Fig. 3—(top center) Electric eye with glass insert surrounded by other moldings with thin walls and delicate inserts that can only be molded by the transfer process. Fig. 4—Spark plug elbow (left) molded within a metal shell and, below, a sectional view; and other examples of intricate transfer molding in commercial production

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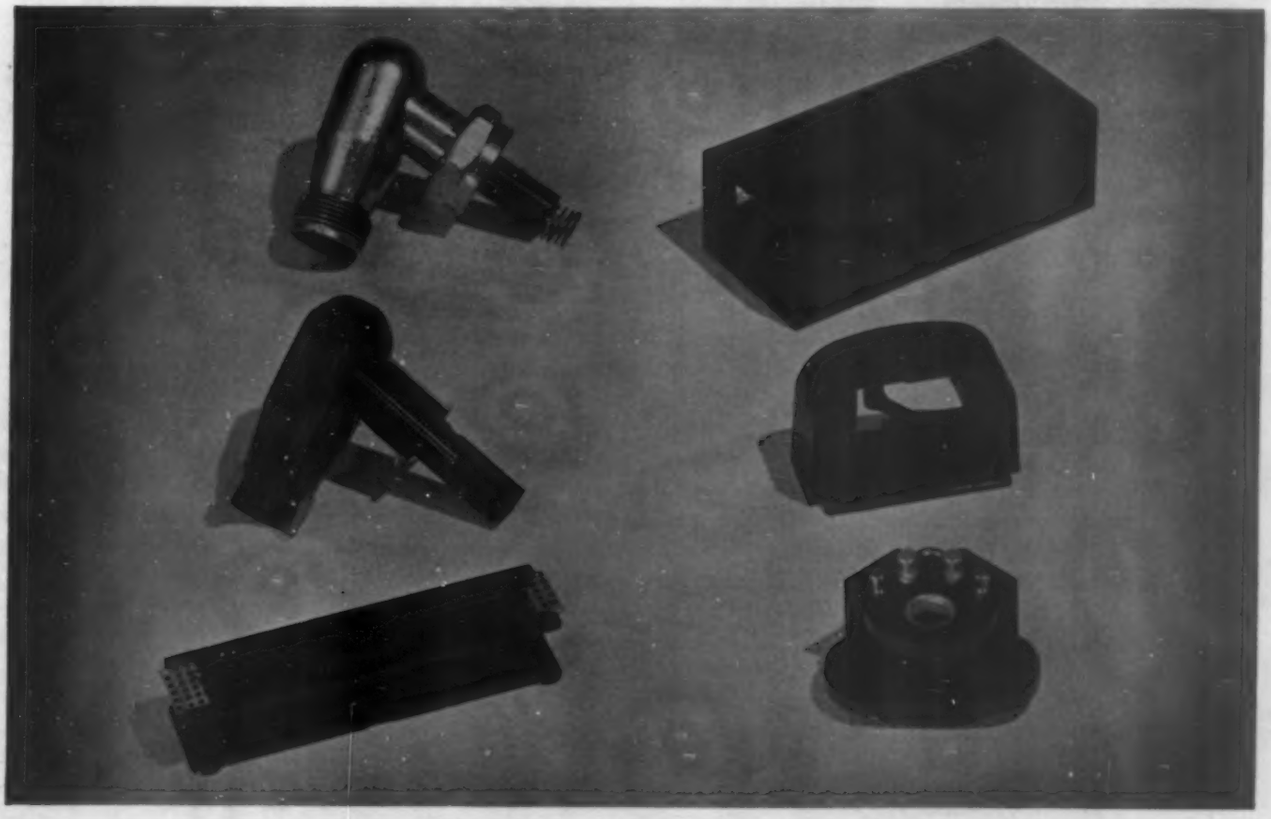


ROHM AND HAAS

DU PONT

Group of chests, designed by Gilbert Rohde, on which transparent Plexiglas discs are used as "pulls." The table at the right, also designed by Mr. Rohde, for Herman Miller Furniture Co., has a 3/4 in. plate glass top supported by transparent Lucite tubes fitted with brushed brass

DECORATION AND DESIGN

by RUTH FLEISCHER

Decorators and designers display initiative and ingenuity in creating new uses for plastic materials

THE WORLD OF TOMORROW IS CERTAINLY APproaching with celerity and directness if one can judge by the field of new materials. Everywhere one sees enterprising manufacturers willing to try the new and unusual in color, in texture and in design.

Nowhere have the results been so gratifying or the future so promising as in the field of home decoration. Let's look at some of the recent developments.

When as utilitarian an object as the telephone becomes less of an eye-sore and more decorative—that's News. This is what the Bell Telephone Laboratories have achieved with their new hand model. The telephone wall box—that bane of housekeepers—has been entirely eliminated, the mechanics of the box being incorporated into the base of the phone. Thus the base is made heavier and more stable, reducing the possibilities of tipping and falling. The speaking apparatus fits closely to the base, obtaining a new unity between the two parts of the phone. A combination of phenolic resins and metal is used to house this model.

In the field of furniture itself, great strides have been made by plastics. A new line of chests in a bedroom group designed by Gilbert Rohde strikes a distinctive note. Mr. Rohde uses a crystal-clear methyl methacrylate plastic for the drawer pulls. Large discs, they reflect the light with jewel-like brilliancy. The discs are supported away from the case on cone shaped brass turnings fastened to the drawer fronts.

Another interesting piece of furniture designed by Mr. Rohde is an all transparent table. The top is plate glass and the legs are made of a methyl methacrylate plastic. The protective caps at the lower ends and the fittings at the top are of heavy brass turnings in brush finish. This is a fine example of how glass and crystal-like plastics may be combined for utility and decorative effect.

Glass, wood and transparent plastic are happily combined in two tables designed by Joe Lopker, well known art director with King Features, for his own apartment. Mr. Lopker used three ovoid pilasters of blonde maple which were slotted and fastened together with 9 in. squares of transparent plastic sheet, a half inch thick. A 26 in. round plate glass top of the same thickness com-

pletes the tables which are placed at either end of a seven foot divan to support crystal lamps.

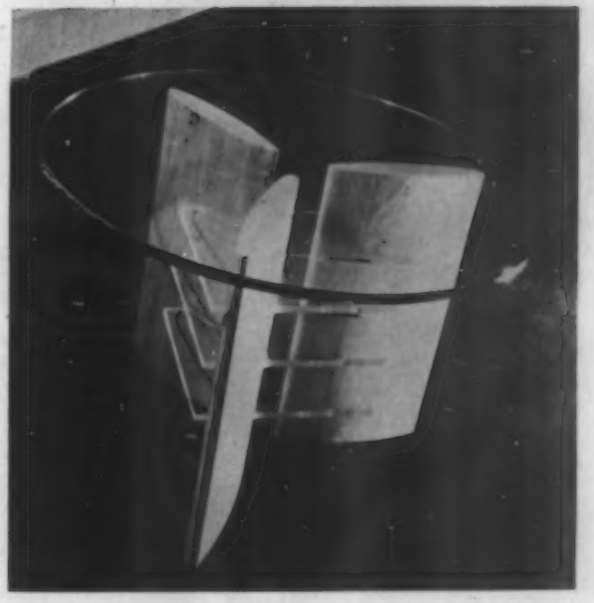
Edges of the plastic shelves pick up room lighting to make an interesting decorative pattern beneath the tables which would otherwise be dull and rather dark at night.

And speaking of possibilities in this field, we asked Mr. Rohde, who is especially interested in the development of plastics to make a few prophecies as to future potential uses.

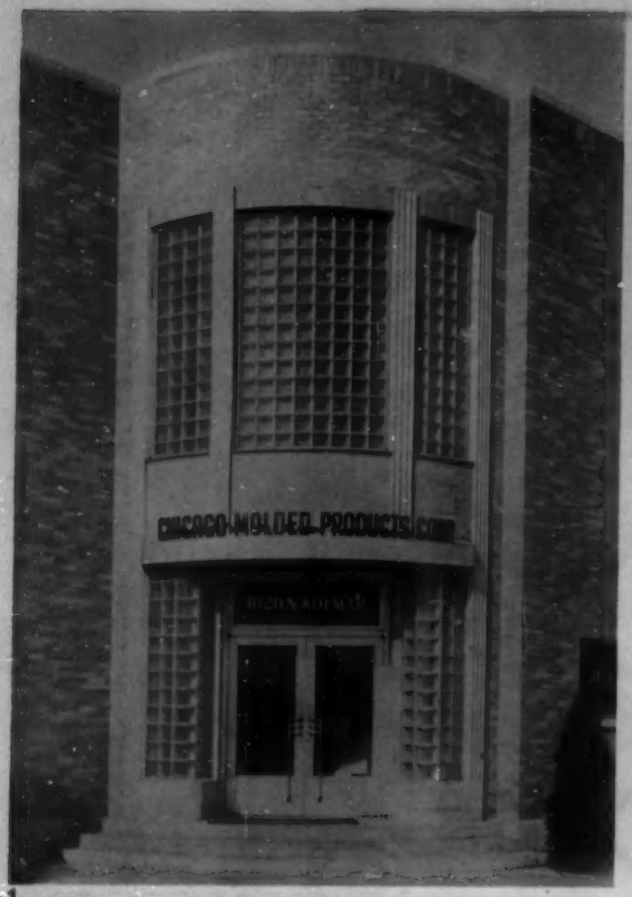
Here are some of his ideas: "The inherent qualities of transparent plastics—permanence and strength—combined with light weight, make them increasingly useful to architects and designers. I have often thought of how effective a living room would be, which has walls of thin plastic material, with sheets on ball bearings to be changed at will, the colors suiting the mood of the moment. Or have the walls stationary with joints holding the sheets frankly exposed and making a pleasing pattern. In the home of the future we shall find transparent colorless plastics used as lamps and lighting fixtures. The ability of this type of plastic to carry light around curves will create new forms for lamps. With its perfect diffusing powers and light weight, translucent plastics will be used effectively for large suspended luminaires. There will be many other decorative applications for plastic materials such as railings and grills, hardware, table utensils and partitions."

And speaking of railings, it is interesting to note here that just recently a stair rail of a methyl methacrylate plastic has been installed in the home of one of the country's leading industrialists. Outside of aesthetic considerations, the practicality of the idea is obvious. Here is a rail that can be easily polished, and which has no surface color to wear through. (*Please turn to page 64*)

DU PONT



The tables above were designed by Joe Lopker for his own home. Three Plexiglas shelves supporting ovoid pilasters of blond maple pick up edge-lighting to form a pleasing pattern beneath the table top which is of glass. Jane Ross designed this three-panel screen (left) and painted the iris motif on the mat-finished side of sheet Plastacele, which is translucent enough to show through on the polished side



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The three views of the new plant of the Chicago Molded Products Corp. reveal the careful planning which preceded its building. The modern entrance (Fig. 1); molding room (Fig. 2) with its high ceiling ventilated at the top; and the paint and lacquer room (Fig. 3) where letters and markings on molded parts are filled in or sprayed; represent the finest possible equipment. Note that presses are set in individual pits so that operators do not have to stand on platforms raised from the floor

CHICAGO HAS NEW PLANT

By J. DELMONTE

ALREADY HERALDED AS ONE OF THE LARGEST and most modern plastic molding plants in the Midwest, the Chicago Molded Products Corp. plant reflects the recent advances of the plastics industry. With the experiences of two previous expansions in plant facilities in 1924 and 1928, this organization has commenced operations in its newly located molding establishment with justified optimism.

This organization entered the plastic molding field in 1920, though prior to that time its facilities were devoted solely to the fabrication of molds and dies. A rapidly growing industry prompted moving to new quarters in 1924, at which location a further expansion in floor space took place in 1928. In the latest move to 1020 North Kolmar Avenue, not only was the plant equipment literally given more breathing space, but also the various departments were coordinated so that the raw material would progressively travel the shortest distance through to its appearance as a finished product ready for shipment. In the 65,000 square feet of floor area, the production space is kept on one floor level, with administrative offices and drafting room located on the second floor. Switch track facilities are located on the west side of the building, with a ramp running down from car floor level to the factory floor.

There are two avenues of approach to the molding department, either through the raw materials entrance on the south side of the building or from the tool room on the north end of the building. Molded parts pass from the molding room to the finishing department through the center of the building. The power plant, boiler room, and accumulators are segregated at the far north end of the molding room.

Raw Materials

A trip through the molding establishment may logically begin with the raw materials department. Separate bins are maintained for drums of the well known phe-

nolic, cellulose acetate, acrylic and urea molding compositions. Particular care is exercised to maintain the excellent qualities of the urea molding compounds by setting aside a separate chamber for these materials. This chamber is air-conditioned with respect to temperature and humidity, maintaining optimum conditions for indefinite storage of these materials. A standard, single cavity preforming machine with a variable speed pulley, and devoted solely to the pelleting of urea compounds, adjoins this chamber. This machine is situated in a room enclosed by glass viewing panels. At the other end of the raw materials storage rooms lie the automatic preforming presses for the phenolic compositions. Each press is placed in a separate dust-proof room with glass viewing panels on all four sides to permit frequent checking by the operator. Maintaining these machines in individual compartments confines the dust arising therefrom to a very limited area.

The doors of the preforming compartments may be opened into a materials weighing and measuring room, which in turn opens into the molding department. Raw materials are fed from this room to the presses about the molding room. Powders may be weighed, and pellets placed into small containers for storage or for immediate delivery to presses, when it is desirous of reducing mold open time and expediting production, by lessening the work of the press operator. Efficient planning of this nature is in accord with recognized good practices of modern molding establishments.

Tool Room

Long experience in the fabrication of molds and dies, has taught the engineers of the company that successful molding can be conducted only with accurate, well made tools. Among the first impressions that one gains on entering the tool room, is the fact that there is adequate light. With glass windows extending to the height of the ceiling, the tool room receives the full benefit of a northern exposure, in which glare is at a minimum and shadows cut down appreciably. Good light is imperative in mold construction work, where close, precision workmanship imposes a strain upon the eyes.

In step with modern trends in machine tool drives, each machine has an individual motor drive, thus eliminating overhead driving pulleys. Serving the various mills and duplicating machines are overhead rails and travelling pulley for transporting heavy molds from one part of the tool room to another. This is another example of wise forethought in the handling of molds, with, at the same time, due regard for the skilled worker. In another section of the tool (*Please turn to page 68*)

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Fig. 4—Injection molding machines include one of 12 oz. capacity. The tool room has northern exposure with full window space to provide adequate light for skilled workers. Figs. 5-6 show wide spacing of machines and ample table working space. Fig. 7 shows press operator removing and inspecting a large molded wheel as it comes from 550 ton press

PLASKON PACKAGES

The house of Roger and Gallet, New York City, traces its ancestry back to the year 1806. Their toilet preparations and cosmetics numbering into the hundreds are sold throughout the world.

The charming "Bonbonnettes" shown below are evidence of Roger and Gallet's deep appreciation of the importance of attractive packaging. The complete assembly (glass containers, the baskets that cradle the bottles and the caps) was designed, and is manufactured, by the Armstrong Cork Company, of Lancaster, Pennsylvania.

The handsome glass containers are threaded to fit into grooves on the inside surface of the baskets, which are beautifully molded of Ivory Plaskon. The baskets are made in two sizes—3½" diameter by 3" high and 3" diameter by 2½" high. In this instance, Plaskon is molded to simulate straw. The finish is dull, except the band near the top, which has a lustrous surface.

Writes the Armstrong Cork Company, "In order to achieve this unique effect, a *high quality plastic* was required, together with rigid control of the molding process and a high degree of technical skill."

Plaskon is quite proud of its selection by Armstrong Cork Company to serve famed Roger and Gallet.

ALWAYS SAY—

For variety of color and beauty of finish, molded Plaskon is unexcelled. But that's only one reason why it is preferred as a packaging material for fine toiletries and cosmetics.

Plaskon is soft and warm to the touch—has a peculiar fascination for delicate feminine fingers. Then too, Plaskon is impervious to oils and greases—is ideal for packaging salves and creams that have oil or grease as a base.

Plaskon can be immersed in organic solvents such as alcohol and acetone for indefinite periods of time without harmful effect or bleeding of color.

Plaskon offers an unlimited range of clean, clear, fadeless colors—dainty pastels, brilliant hues, purest white, jet black. Its surface lustre may be made as high as desired. And the moldings are completely resistant to chipping, rusting or corrosion.

Plaskon being solid molded color, neither scratching nor abrasion impairs its color value. It can be made in almost any degree of translucency, thus imparting a jewel-like quality to the molded form. Plaskon's many advantages have made it the world's most widely used molding material of its type.

Plaskon's facilities for research, design and engineering are at the disposal of any concern using or contemplating the use of plastics. For complete information, write

Photos Courtesy of
ROGER AND GALLET
New York City

Molded by the
ARMSTRONG CORK COMPANY
Lancaster, Pa.

PLASKON COMPANY INC.
2121 SYLVAN AVE. ★ TOLEDO, OHIO
Canadian Agent: Canadian Industries, Limited, Montreal, P. Q.

Trade Mark Registered

PLASKON

★ MOLDED COLOR ★

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PLASTICS IN REVIEW

1. Stewart-Warner's Campus radio, styled by Barnes & Reinecke, features a Lucite pointer, lighted from within, which eliminates the conventional illuminated dial. Brown Durez houses the model shown; obtainable also in ivory Plaskon with contrasting colored dial of the same material

2. Designed to harmonize with several types of furniture, this modern bed lamp was molded by Jos. Stokes Rubber Co. for Eagle Electric Mfg. Co. Shades have a special slotted arrangement facilitating easy removal for cleaning or washing. Model shown is walnut Durez

3. Ribbed for easy breakage, Catalin tipped dispenser and seal insure rapid emergency action of the E-Z Effervescent Fire Extinguisher, designed by Mabel L. Blair. Opened, a continuous stream is projected by a syphon connected to synthetic rubber lined closure. Tips are by Colonial Kolonite Co.; closures by Crown Cork and Seal Company

4. Pompous penguin cigaret lighter molded by Kilgore Mfg. Co. promotes Brown and Williamson's "Kools." Black and white body and yellow beak and feet are of Lumarith, while gray hat is of a heat-resistant phenolic. Louisville Electric Mfg. Co. handled the assembling and the bird's electrical "innards"

5. It's the last straw—pops right out of the pop bottle. Called "XYZ" by a St. Louis manufacturer, the sterile straw is cellophane in two colors swaged together. The end is is heat-sealed, imprisoning a little air which propels it up when bottle is opened. Nipping the straw unseals it

6. Sanitary, easy to clean, the opaque ivory Plaskon filling unit holds the tubular containers into

which the Jolly Gulp confection is poured and packaged. A jutting trough forms a run-off reservoir. Sponsored by Pectin Industries, Inc., the kit was molded by Imperial Molded Products Corporation

7. Trylon and Perisphere of the coming N. Y. World's Fair serve as models for these novel salt and pepper shakers. They are injection molded of brightly colored Tenite by Thos. Mason & Co. Distributed by W. T. Stopford Co.

8. The Jiffy Jigger says "when" pouring exactly one ounce at every operation. A tasteless, non-corrosive dispenser, it seals itself, preventing loss by spilling or evaporation. Construction is stainless steel, copper and colored Plaskon, molded by Beaman's Molded Products Co.

9. Five molded parts together with metal plunger comprise the Pax soap dispenser styled for the G. H. Parkwood Mfg. Co. by Barnes & Reinecke. The black body and red medallion are of general purpose and cellulose acetate Textolite, respectively

10. Rotary bottle washer for hard-to-reach corners has handle and grip of ivory Plaskon molded by Universal Molding Company

11. Chatillon "all-purpose" scale is injection molded of cellulose acetate with name branded in by hot press and wiped over with special ink. Capacity is fifteen pounds

12. Talk about weather? Two new Airguides by Fee and Stemwedel, Inc. register temperature and relative humidity. Both wall model and smaller easel-type have chromium trimmed black Durez cases molded by Chicago Molded Products Corporation

13. Sweep over curls with Pro-phy-lac-tic's Roll-Wave Hair brush with its sun-burst of bristles. The ivory plastic back is curved to fit the grasp of the hand and the shape of the head

14. Cigaret holder by C. M. Pearson is phenolic cast resin built around seamless brass tubing. Inserts of abolone shell are beveled and glued into hexagon shaped blocks. Obtainable in 4½ in. and 6 in. lengths

15. "Through The Looking Glass" dresser set has been introduced by Glassolin Products Co. The entire comb, the frames for the brush and this mirror illustrated are produced from clear Bakelite polystyrene

16. This cross-section view of American Bosch vertical type distributor shows placement of two right angle inserts each on a different level, exposed both ends. Northern Industrial Chemical Co. molded this intricate piece of Makalot

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Many of these items and others pictured throughout this issue are on display in our editorial offices during this month

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PLASTICS IN REVIEW

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17. Twin plastic units give the "Zig-Zag" and "Pull-Push" rules displays protection from dust, dirt, pilferage. Each unit has black plastic base molded by Northern Industrial Chemical Co. for Stanley Tools, Lumarith-Protectoid front, wood sides and metal trademark plate in color

18. Chrysler Emblem, inlaid with vitreous enamel, was made by Fox Company to be used in conjunction with a plastic glove box panel

19. To prink up the noses of 1939 de luxe models, as part of its radiator ornament, Chevrolet uses a clear piece produced with Lucite, compression molded by American Insulator Co. and General Industries Company

20. Eavesdroppers and kibitzers take note of the Lumarith Double-h-Ear molded for John J. Ross Corp. by Universal Plastics Corp. The extra telephone is especially useful for repeating long conversations or witnessing verbal agreements. Installation is not necessarily permanent

21. An all-pleated lamp and shade of Lumarith Charmour, made by Franklin Lamp Mfg. Co. innovate a smart decorative treatment for an item long since familiar in plastic materials

22. Valve handles made of black Durez by Church Mfg. Co. are of new

easy-grip design; sizes range from 1 7/8 in. to 3 in. diameters. They are available with or without inserts

23. Fido's worries are over, for fleas will drop right off his back after exposure to the Leray lamp. The infra-red rays generated are death to any kind of parasite including eggs and larvae. A Bakelite handle by Kurz-Kasch protects the user from the excessive heat

24. Fussy, frothy flower-pots and waste paper baskets designed by Adler-Jones, are of "Lamite." These products consist of cellulose acetate pressed over a hot mold and put on it layer by layer

25. Firestone Air Chief makes its debut in rich walnut Durez. Push button tuning, dial tuning knob on the end, and other fittings are molded of the same material

26. With the portly demijohn in mind, Roger & Gallet conceived a distinctive cologne container. Armstrong Cork Co. molded the stopper and basket of ivory Plaskon. The basket, ridged to give a wicker effect, screws on to the bottle for protection and provides a secure grip

27. Sectional illustration of McDonnel & Miller's "snap" switch, housed in plastic, shows construction and operating characteristics

28. Palm-sized, the new 4-tube "Emersonette" with 4 in. speaker and illuminated dial comes in four colors of Bakelite. Cabinet is 6 1/2 in. wide, 4 3/4 in. high, and 3 1/4 in. deep

29. Light-weight eye shield made by Boyer-Campbell Co. has a 4 in. by 9 in. Plastacele visor which hinges upward to a fiber crown when not in use. Aluminum binds the transparent front permitting individual shaping

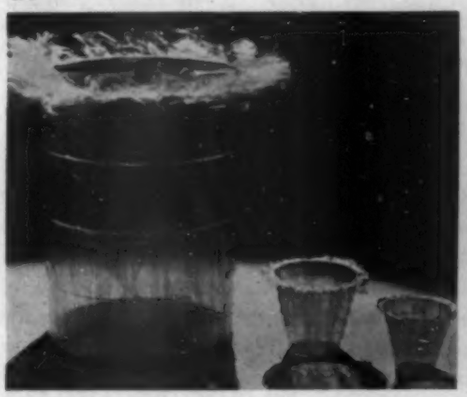
30. For the duplicate contract enthusiast, F. E. Teal, Ltd., has designed a sturdy set of bridge-boards, each nesting securely in the one beneath to prevent sliding or turning. Tops are molded in ivory Bakelite urea and bases in black phenolic material by Universal Molding Company

31. E. A. Myers & Sons produced this direct action Bone Conductor Receiver with new magnetic vibratory plate. Rathbun Molding Corp. molded the lightweight Durez case

32. Smoothly finished, there is no flashing on the inside of the Vacuum sweeper nozzle, injection molded of acetate on a single cavity mold shooting three per minute. A. P. Schraner & Co. made the mold for Zenith Metal Products Company

Manufacturers' addresses will be sent if you will write to the Editor, enclosing a 3-cent stamp for reply.

24



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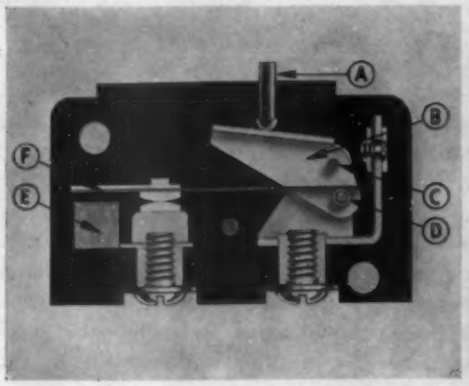

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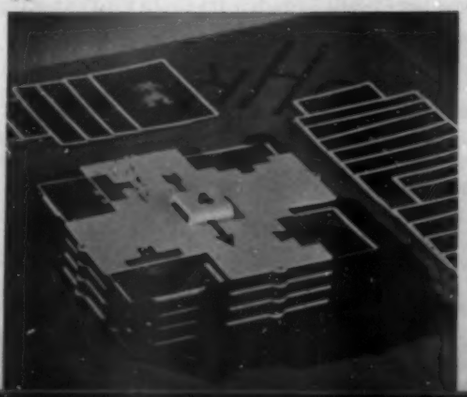

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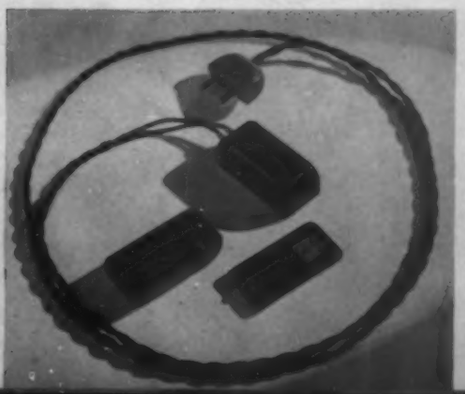

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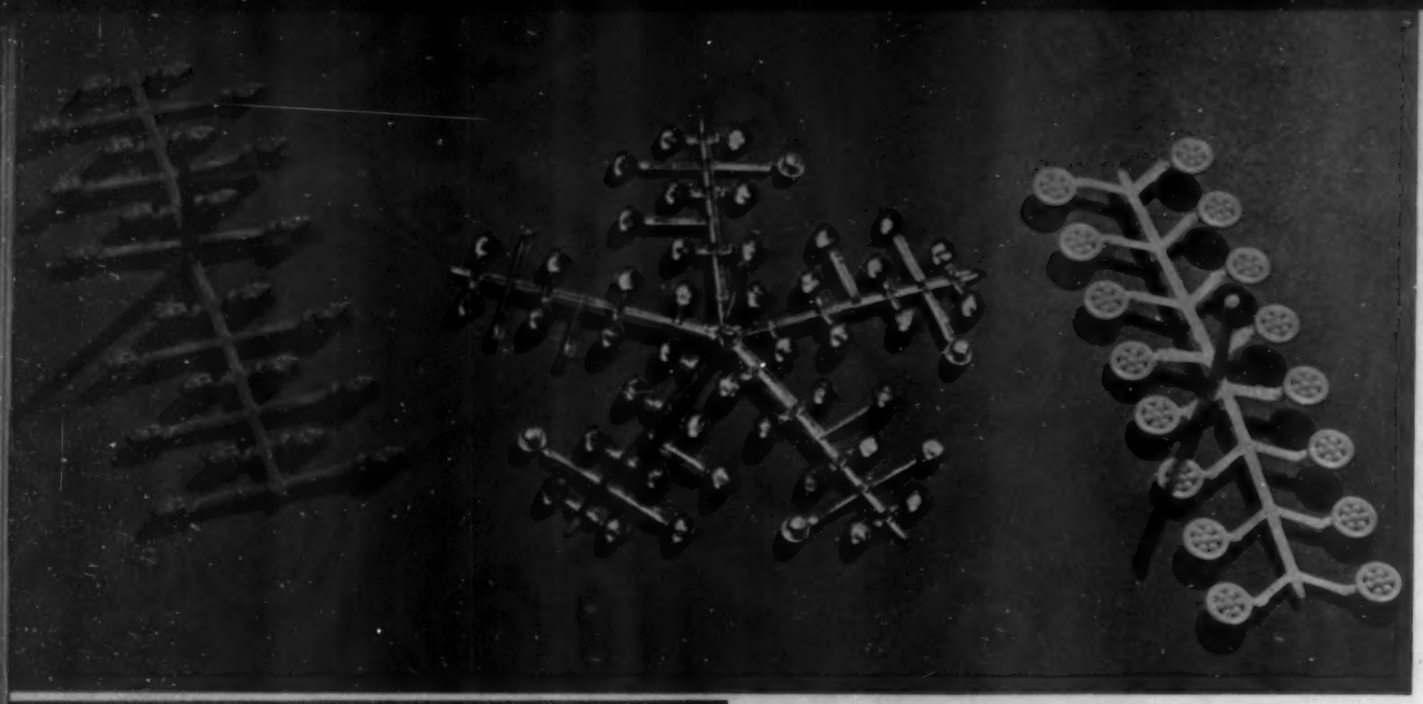
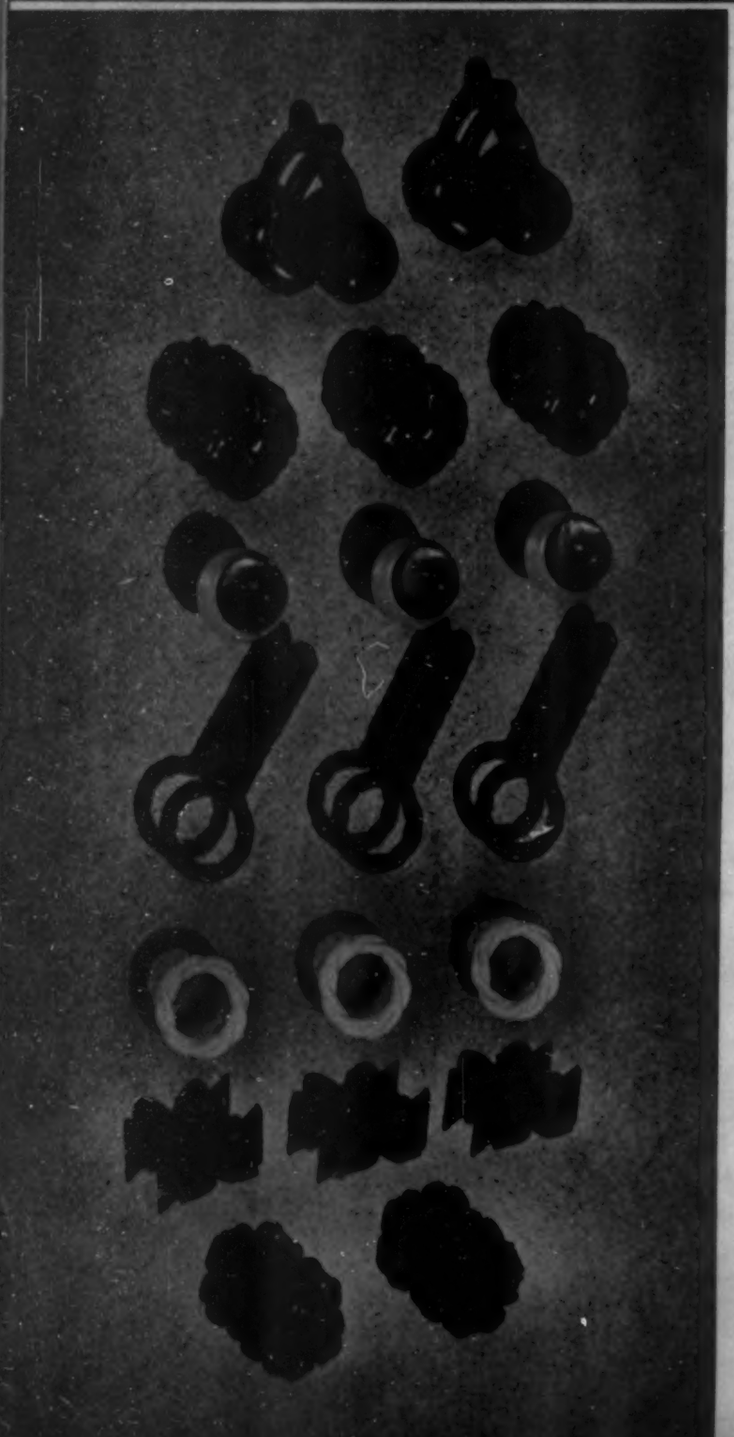




BUTTONS

Molded in millions by modern methods

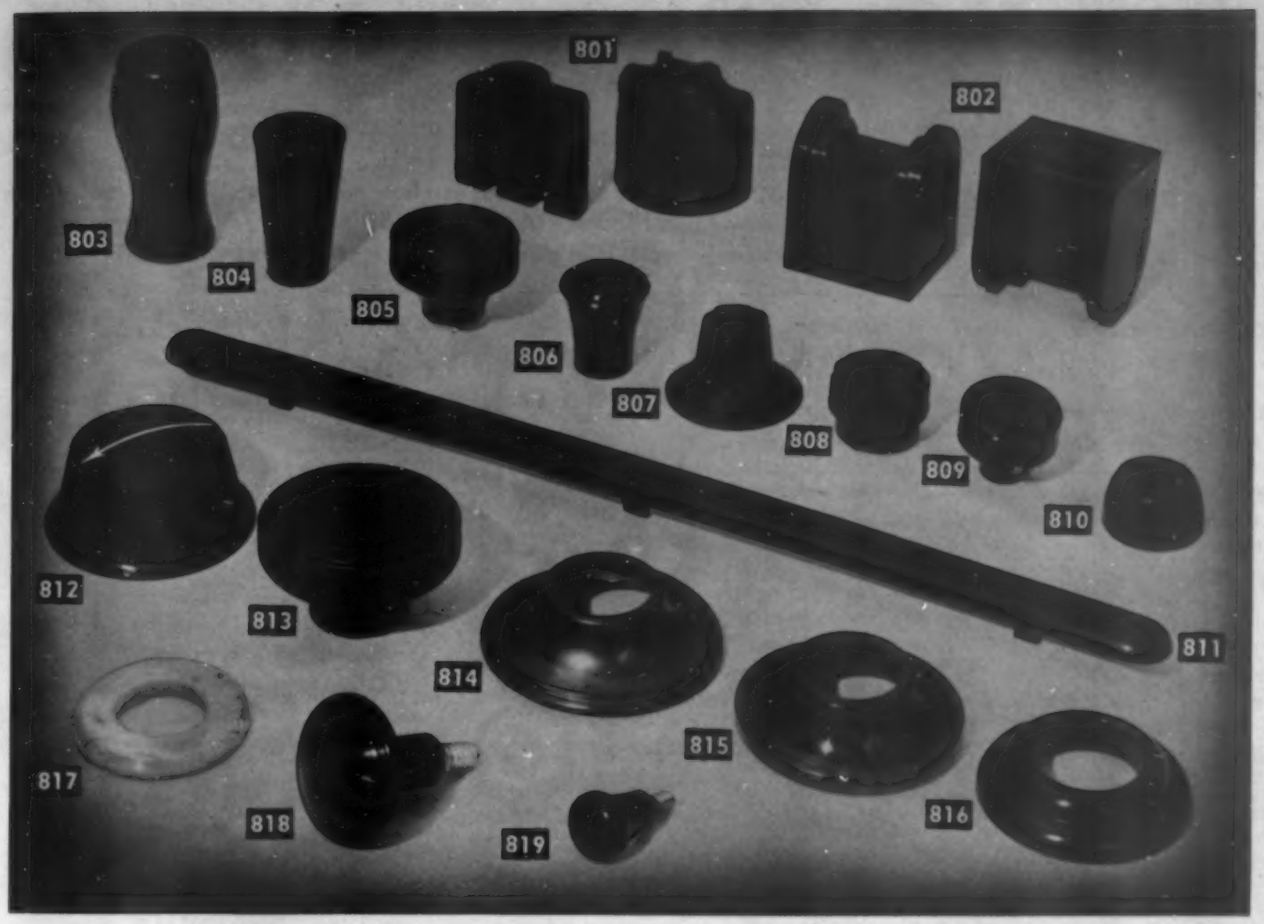
TWELVE, SIXTEEN OR SIXTY AT A TIME, THE buttons shown above pop out of an injection molding machine and, like berries on the branch of a fertile bush, have only to be picked from their stem to be ready for use. Patterns are intricate and varied. Colors are brilliant and permanent and go all the way through.

Time was when buttons like these were carved by hand from bone, ivory and nuts. Slow tedious work which made them costly and rare. Then came casein and cast resins from which they were carved, machined and polished. Sewing holes had to be drilled by hand. Now these holes are molded in with no rough edges to wear the thread.

From fifty thousand to two hundred and fifty thousand buttons can be made on a single press in a twenty-four hour day depending upon the number of cavities in the mold from which they are turned out. The manufacturer of these buttons has seventeen such presses running in three shifts.

The buttons require little finishing, just a touch on a buffer where they are broken from the stem. The stems or sprues are reground and used again so there is little waste. Hook, eyes, umbrella tips, and many other small items are made by this injection molding process and new plastic materials with greater resistance to heat (now in production) will broaden its utility to industry in many obvious ways.

The variety of buttons and dress ornaments made by Commonwealth Plastics Co. is indicated by those illustrated at the left. At the top of the page some of the buttons are shown attached to their sprues as they come from the injection press



Reprints of sheets One to Fifty-Two—in book form, 25c in coin or stamps

STOCK MOLDS

SHEET SEVENTY-FIVE

Escutcheons, handles, radio and control knobs are available from stock molds. When requesting samples interested executives should write on company letterhead

801. Connector body molded in two halves

802. Handle ends with opening 3/16 in. in diameter

803. Handle 1 3/4 in. high with opening 7/16 in. in diameter at top and 5/16 in. at base

804. Lever handle 1 1/4 in. high with 5/16 in. opening at top and bottom

805. Knurled knob with brass insert; top, 1 in. in diameter

806. Tapering knob approximately 7/8 in. in diameter with brass insert 3/16 in. in diameter

807. Control knob 11/16 in. high with 9/16 in. opening. "On" and "Off" are molded in

808. Knob 9/16 in. high; threaded opening 1/4 in. in diameter

809. Knob 5/8 in. high; opening 1/8 in. in diameter

810. Foot 3/4 in. in diameter at base; opening 1/4 in. diameter

811. Decorative inlay strip 8 in. long and 7/16 in. wide

812. Radio control knob, 1 3/8 in. in diameter, with directional arrow

813. Knob with knurled edge 7/8 in. high; top, 1 1/2 in. in diameter

814. Escutcheon 1 5/8 in. in diameter with a 5/8 in. opening

815. Escutcheon 1 1/2 in. in diameter with a 5/8 in. opening

816. Escutcheon 1 1/8 in. in diameter with a 11/16 in. opening

817. Escutcheon 1 3/16 in. overall diameter with a 1/2 in. hole

818. Knob 1 in. high with a 3/8 in. stud

819. Knob 1/2 in. high with a 1/4 in. stud

Address all inquiries to Stock Mold Department, Modern plastics, Chanin Building, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

STOCK MOLDS

SHEET SEVENTY-SIX

These parts are available without mold cost from manufacturers' stock molds. Address all inquiries to Modern Plastics, Chanin Building, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

779. Testing socket for all types of glass radio tubes, 4-5-6- and 7-prong

780. Testing socket for all types of metal and glass octal radio tubes, 5-6-7- and 8-prong

781. Standard 4-5-6- and 7-prong base for large or small glass radio tubes

783. Base for metal tube with 5, 6, 7 or 8 prongs. Used also for condensers

784. Octal glass tube base for large and small types, with 5, 6, 7 or 8 prongs

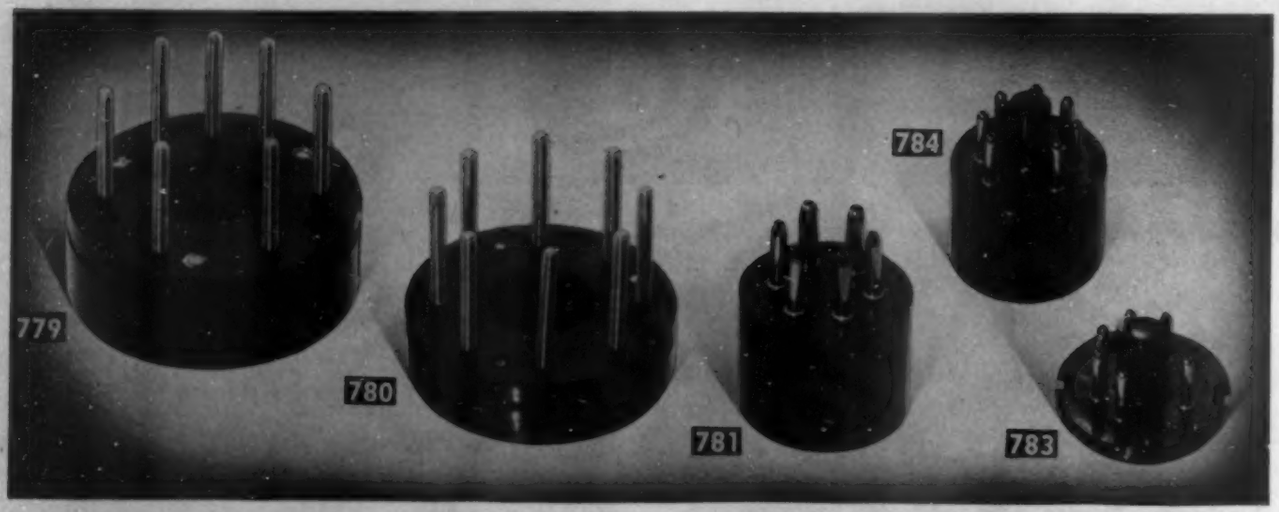
786. Rayon spinning bucket cover, 6 in. in diameter and 5/32 in. thick

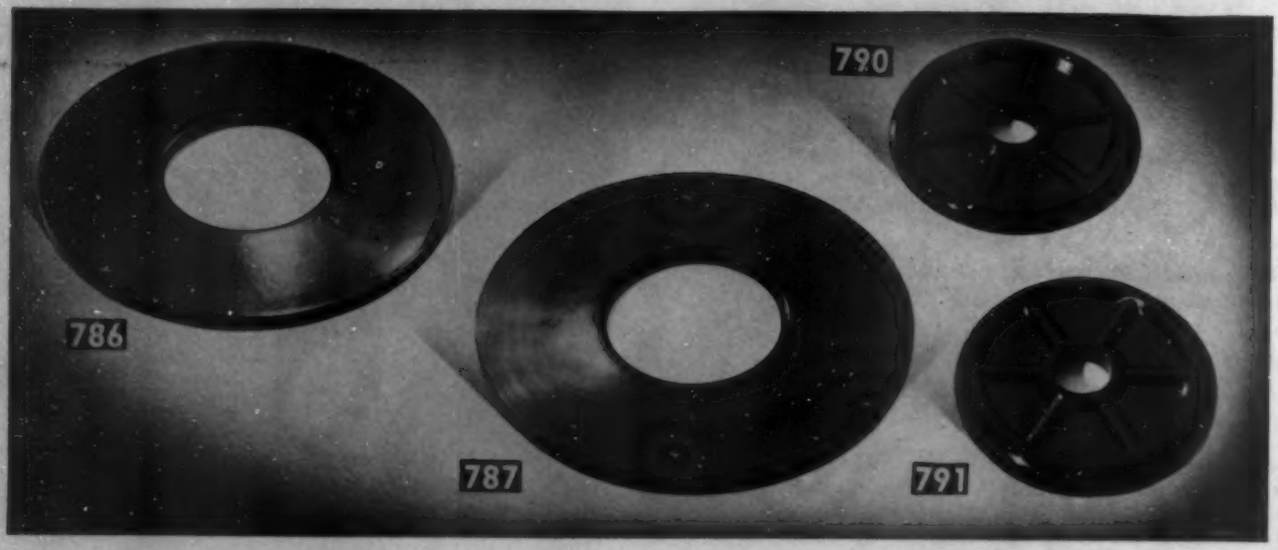
787. Rayon spinning bucket cover, 7 in. in diameter and from 5/32 in. to 1/4 in. thick

790. Sheave for harness on textile looms, 3 3/8 in. in diameter

791. Sheave for harness on textile looms, 3 3/4 in. in diameter

Reprints of sheets One to Fifty-Two are available in book form. Twenty-five cents in coin or stamps





PLASTICS AT BALTIMORE A.C.S. MEETING

THE PLASTICS GROUP OF THE DIVISION OF PAINT and Varnish Chemistry of the American Chemical Society met in Baltimore, Maryland, on April 4. The Chairman, Dr. H. R. Dittmar, had nine papers scheduled for the meeting. Six of these dealt with various applications of plastics, in keeping with the predominantly industrial background of Baltimore. Although in no sense a resin manufacturing or molding center, there are many industries in Baltimore which utilize resins or plastics in preparing their products for the market. The remaining three papers were concerned with matters of molecular structure and resin reactions and provided plenty of interesting material for the after luncheon discussion. Abstracts of the papers are presented herewith.

A VIEW OF ORGANIC PLASTICS BY THE AUTOMOTIVE INDUSTRY. *S. G. Saunders.* The automotive industry is constantly striving to furnish to the world safer, cheaper, and more efficient motor transportation. The automobile designer has for a long time dreamed of a motor vehicle which could be molded or pressed in one piece out of some composite material which would have high strength, toughness, resistance to shock, beauty of color, and a smooth, durable finish. The production men dream of a material which can be easily formed or shaped, and which attains a highly polished finish with very little labor or machine work. The American plastics industry will have to advance considerably in the development of new materials of much higher structural quality if it expects to sell its product to major industries for the manufacture of functional structures and mechanism. The ideal plastic for use in the automobile would have the strength and rigidity of alloy steel, the ease of forming and shaping of potter's clay, the toughness of sugar maple, the colors of the rainbow, and the finish of "Superfinished" tool steel. To accomplish all this in a year or so would be impossible by the boldest of pioneers in plastics research, but the automotive industry would like to witness signs of progress or improvement in plastics to fit its needs. The automobile companies are anxious to assist in the necessary research and development work. The prosperity which has been experienced by the steel and rubber industries through the patronage of the automotive industry should be an incentive to the plastics industry to strike out along the new paths outlined in this paper.

PLASTIC MATERIALS IN TELEPHONE USE. *J. R. Townsend and W. J. Clarke.* Hard rubber, shellac, and asphalt, once widely employed in the construction of telephone apparatus, have been largely replaced for many applications by phenol resins, cellulose acetate, and other synthetics because the latter are of a higher level of quality, are more constant in their properties, and are more susceptible to the establishment of engineering standards. The new materials have thus contributed to the maintenance of the high and uniform quality of the telephone service of today. In subscriber station apparatus, ready moldability, high impact strength, and permanence of appearance are but a few of the important requirements placed upon the molding material. At present a black phenol plastic has proven to be the most satisfactory for the familiar telephone handset. Other specific properties that must be considered for certain apparatus are resistance to "cold flow" and to moisture. No materials may be used in the telephone plant which create a serious corrosion or fire hazard that might endanger other equipment. Phenol fiber is the principal sheet material, having replaced sheet hard rubber because of its better "cold flow," permanence to light, and good punching qualities. Cellulose acetate is mostly used in thin foil form as an interleaving material between windings of relay coils, although a few small parts are being injection molded of a cellulose acetate plastic and considerable switchboard wire is coated with an acetate lacquer. Baked alkyd and phenolic resin enamels are widely employed not only for their decorative value but for their superiority in resisting perspiration, abrasion, and corrosion. A minor but growing use of synthetic resins is as adhesives.

THE APPLICATION OF ORGANIC PLASTICS TO TEXTILES. *Kenneth H. Barnard.* This is such a new development that any attempt at a historical review boils down to a discussion of current events. Thus, even the earliest synthetic resin used on textiles, urea-formaldehyde for imparting added resiliency, still has some years to run under the original crease-resistant patents granted to Tootal in England. This case is typical in another direction of the use of resins on textiles. Practically all of them impart properties to the goods which are permanent, that is, they do not disappear during normal cleaning operations. In comparison with the ordinary finishes which are nearly completely removed by the first passage through the wash tub or dry cleaning, these new finishes are desirable from a consumer standpoint. The qualities required were listed and illustrations of how they may be obtained were presented.

APPLICATIONS OF RESINS IN THE BUILDING INDUSTRY. *F. O. Anderegg.* Resins are included in protective and decorative coatings applied to outside and inside surfaces of buildings and to much of the mechanical equipment. Resins as binders for plywood have made notable improvement in its durability, thereby making it available for wide application. Various fibrous materials are bonded together with resins to form: fibrous wall board, roofing and siding, linoleum and floor tile, laminated products for wall finishes, table and counter tops, and cabinets. Spectacular effects are being secured in the laminated products with transfer impressions. Finally, many special molded products find application, including: hardware, lighting and other electrical fixtures and parts, and moldings for corners.

SYNTHETIC MATERIALS IN THE COATED FABRIC FIELD. *Dorman McBurney.* During the last quarter of a century waterproof protective coatings for fabrics have been chiefly of the drying oil, rubber, or pyroxylin types. Current trend involves application of a wide variety of synthetic materials possessing both film-forming and plasticizing properties. These materials include cellulose ethers and esters, alkyd resins, modified dimethylol urea resins, vinyl resins, methacrylate resins, chemically treated rubber, and polymerized acetylene derivatives with rubberlike properties. Among the new fabrics may be mentioned: special high strength rayon, woven glass fabrics, nylon, and fabrics woven from metallized cellulosic film resulting in non-tarnishing tinsel effects. Combinations of certain of these developments have resulted in marked improvement in coated fabrics (*Please turn to page 76*)

LIQUID RESIN—PLYWOOD ADHESIVE

by KARL KÖPPLIN[1]
RODDIS LUMBER AND VENEER CO.

LIQUID PHENOLIC RESIN OF THE ALCOHOL soluble type is easily and simply spread in the typical plywood factory. The technique employed is identical with familiar wet glue methods of spreading. The only change in equipment is the substitution of a fabric or carpet roll for the orthodox steel or rubber roll. Preparation of the glue for spreading is simple, inexpensive and requires no additional equipment. The mixed glue to which catalyst has been added may remain in the spreader indefinitely. Assembled stock may be pressed immediately after spreading or it may stand for two to three weeks. Moisture content of plywood assembly prior to hot pressing is held to a minimum, apparently not obtainable with other resin glues of dry film or water soluble types. It is now possible to glue any thickness or species of veneer with freedom from glue stain. Shear strengths for phenolic liquid resin laminated plywood are materially increased.

Alcohol soluble liquid phenolic resin glue represents an inevitable simplification in the science of application, control and utility of resin glues for hot pressed plywood. It makes possible the economical production of an improved plywood with no deviation from methods of glue application developed throughout years of practical experience by the plywood industry. The gluing process is greatly simplified and time required for the operation is reduced to a minimum. The resultant bond is completely water-proof, mold-proof, fungi-proof and insect-proof. The plywood manufacturer is doubly insured against costly glue failure by the ability to easily and precisely vary glue spreads for differing species of woods and by absolute control of moisture content in the assembly process. This liquid resin glue is stainless and can be used on the most delicate face veneers with unvarying success. It is admirably suited to curved or bent work due to the flexibility of the liquid resin bond. The field of usefulness of plywood is once again greatly extended by the practicability of manufacturing an improved phenolic resin bonded plywood at glue line costs which compare most favorably with older types of non-resinous glues.

Shear strength of liquid resin plywood

In order to properly evaluate strength of phenolic liquid resin glue bonds it appears desirable to compare data recently developed for this glue,[2] with published data[3] indicating shear strength of dry film glue.[4]

COMPARATIVE SHEAR STRENGTH OF DRY FILM AND LIQUID RESIN PLYWOOD

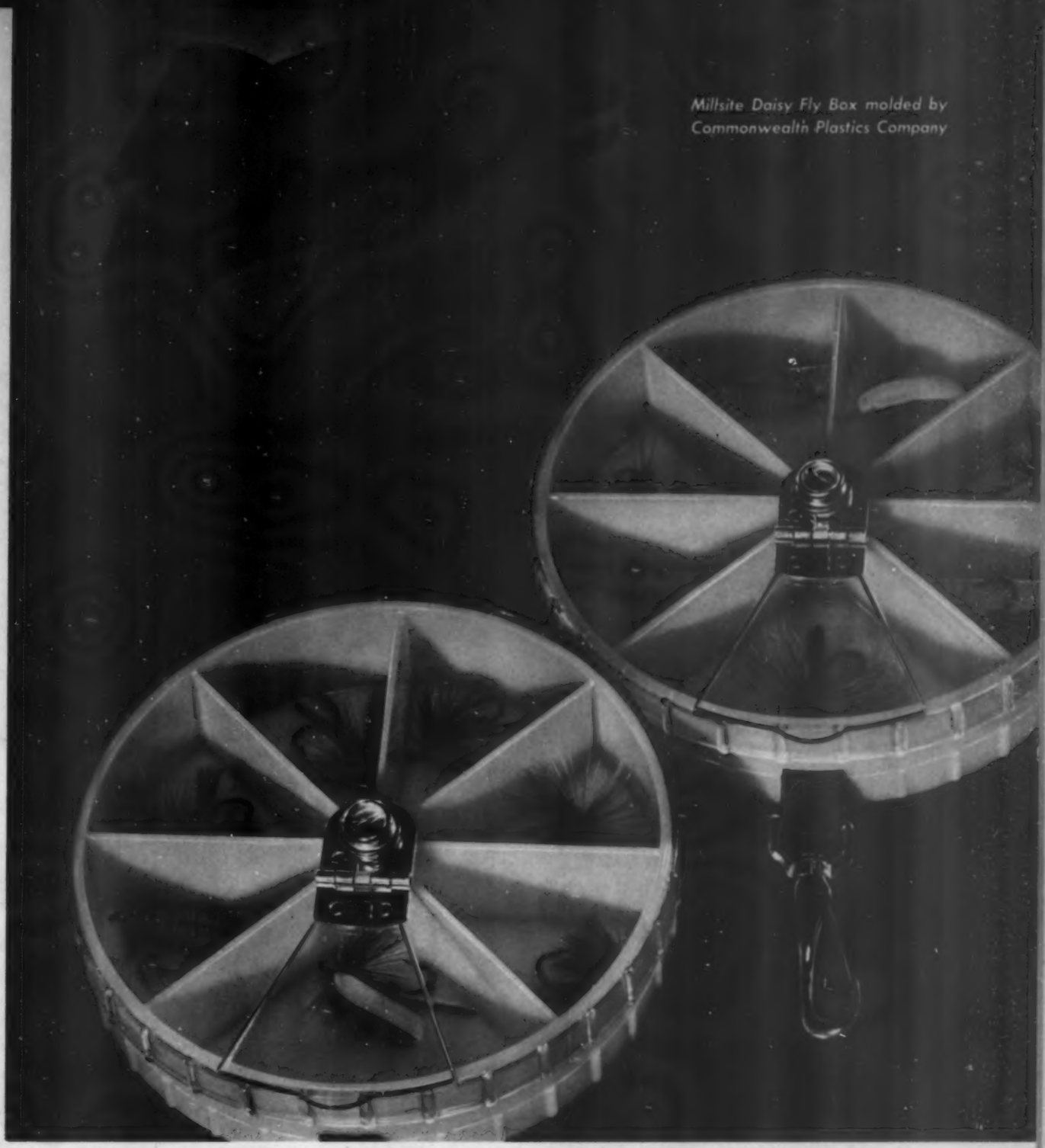
Moisture content	Platen temp.	Net bonding time in minutes 2	4	6	8	10	Test sample
		Shear strength, lbs. per square inch					
7 to 9%	300° F.	195	310	370	415	420	1
"	"	250	350	390	425	430	2
"	"	250	370	395	430	440	3
"	"	260	400	470	430	450	4
"	"	295	420	470	450	485	5
Liquid Resin Average		250	370	419	430	445	
Dry Film Average[3]		250	300	350	360	380	
Increase in shear strength of liquid resin over dry film		0%	23.3%	19.7%	19.5%	17.1%	

Veneer construction used for above shear tests was 3 ply 3/16" birch, suggested by Forest Products Laboratory at Madison, Wisconsin, accepted and used in the specification for aircraft of the U. S. Army and Navy. Shear tests were made in a Riehle machine on wet samples after 30 minutes boiling. Test specimens were picked at random and laminated under a specific pressure of 250 pounds per square inch.

Shear tests clearly indicated that liquid resin bonds were stronger than dry film bonds. To carry the studies

Hot press for testing Catabond under production conditions. (Courtesy, Catalin Corporation)

1. Paper prepared for presentation to the American Society of Mechanical Engineers, September 23, 1938.
2. Catabond, made by Catalin Corporation of America, New York, N. Y.
3. Hot Pressing Technique for Plywood, A.S.M.E. Transactions for January 1938.
4. (Ed. Note: To provide a really valid comparison of the strengths of plywoods made with dry resin film and liquid resin, data should also be shown on the amounts of resin present in each case. The strength and also the specific gravity of the plywood increase as the resin content becomes greater and the degree of resin impregnation more pronounced.)



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to a logical conclusion further specimens from this same lot were boiled 30 minutes and shear tests made twenty-four and forty-eight hours later. Two curious but highly significant facts emerged. Specimens cured two and four minutes showed an increasing shear strength and the four-minute cure was ample for all commercial or aircraft purposes, being equal to a nine-minute dry film cure.[5]

AVERAGE LIQUID RESIN SHEAR STRENGTH AFTER 24 AND 48 HOURS

Moisture content	Platen temp.	Net bonding time in minutes 2	4	6	8	10	Drying period
		Shear strength, lbs. per sq. in.					
7 to 9%	300° F.	285	372	407	423	475	24 hours
"	"	358	408	434	427	466	48 hours

In some instances shear strength decreased slightly after test specimens became thoroughly dry due to the lowered tensile strength of wood. The important fact, however, is the increase in strength of the liquid resin bond forty-eight hours after pressing for the two and four-minute cures. The two-minute cure increased in glue bond strength until, at an average of 358 pounds per square inch, it approximates the shear strength of an eight-minute dry film cure, while the four-minute cure reached an average shear strength of 408 pounds per square inch, approximately eight percent stronger than the maximum average shear strength of dry film glue after 30 minutes press time.[4]

Liquid resin in aircraft plywood

The superiority of liquid phenolic resin bonds in respect to shear strength inevitably led to liquid resin glued aircraft plywood. Minor difficulties were encountered and overcome in the spreading operation. This was to be expected in view of the thinness of veneer and entailed a few mechanical changes in the spreader. The result of these pioneering efforts in laminating very thin veneers with liquid phenolic resin glue was production of an aircraft panel of shear strength greater than any previously manufactured. Comparative shear strength tests on dry film and liquid resin were as follows:

Navy Aircraft Plywood (.0699 in.-.0233 in. 3 ply) Tested Dry

Sample	Dry film	Liquid resin
1	270 lbs. per sq. in.	342 lbs. per sq. in.
2	315 "	351 "
3	324 "	351 "
4	342 "	351 "
5	351 "	396 "
6	351 "	414 "
7	369 "	432 "
8	414 "	432 "
9	432 "	477 "
10	432 "	486 "
Average	360 "	403 "

Increase in dry shear strength of liquid resin over dry film—12%

Navy Aircraft Plywood (.0699 in.-.0233 in. 3 ply) Tested Wet

Sample	Dry film	Liquid resin
1	324 lbs. per sq. in.	432 lbs. per sq. in.
2	342 "	432 "
3	351 "	432 "
4	360 "	495 "
5	360 "	495 "
6	360 "	504 "
7	360 "	522 "
8	378 "	567 "
9	396 "	585 "
10	400 "	621 "
Average	363 "	509 "

Increase in wet shear strength of liquid resin over dry film—40%

Navy Aircraft Plywood (.0699 in.-.0233 in. 3 ply) Tested After 10 Day Fungi Test

Sample	Dry film	Liquid resin
1	468 lbs. per sq. in.	576 lbs. per sq. in.
2	504 "	584 "
3	540 "	584 "
4	558 "	612 "
5	594 "	612 "
6	594 "	621 "
7	594 "	666 "
8	612 "	675 "
9	612 "	702 "
10	684 "	720 "
Average	576 "	635 "

Increase in fungi shear strength of liquid resin over dry film—10%

In excess of 50% glue failure was noted on 80% of fungi exposure dry film samples, and in no instance did glue failure exceed 25% for 10% of liquid resin specimens.

Shear tests were made in accordance with U. S. Navy Department specifications and were accepted by a Navy inspector. No liquid resin specimens were disregarded because of wood failure. Navy specifications[6] state, "whenever a specimen fails at a load less than the values specified, and with a wood failure of 50% or greater the specimen shall be disregarded in computing the average." If wood failure is taken into consideration there is reason to believe that military dry shear test specifications could easily be increased to the suggested standard of 450 pounds per square inch for the wet test.

Shear tests of liquid resin glued aircraft plywood are chiefly limited by the tensile strength of the wood. There is evidence that tensile strength of wood is materially increased by the tendency of liquid resin to impregnate the core in spreading and penetrate face in pressing. If research in this atea proves fruitful, it is possible that the plywood industry can make a major contribution to the science of aircraft and pre-fabricated house construction by producing a laminated panel of wood and resin which is stronger than the wood itself and is admirably suited to exterior exposure.

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5. Table 5, Hot Pressing Technique for Plywood, A.S.M.E. Transactions for January 1938.
6. Navy Department Specification—39P13B, Nov. 1, 1934.

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Plastics Digest

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

CELLULOSE AND RESIN PLASTICS. Chem. and Met. Eng. *46*, 114–5 (Feb. 1939). Trade review for 1938. Outstanding trends are said to be (1) production of all varieties of both cellulose and synthetic resins by a few large manufacturers, (2) production of these materials by chemical manufacturers, and (3) the molding of plastics by the rubber companies. It is estimated that 80% of all safety glass made in 1938 contained cellulose acetate, the remainder being made with vinyl acetal resin. It is predicted that approximately 50% of the 1939 safety glass will have the vinyl resin interlayer. Cellulose acetobutyrate molding composition appeared on the market at 60 cents per lb. compared with 52½ cents for the acetate compound in colors (30 cents for black). Its lower specific gravity and superior properties make it competitive with the acetate material. Production of phenol resinous molding compositions for 1938 is given as 43,000,000 lbs. with 20,000,000 additional lbs. of resin used for other purposes. Cast resin output is cited at 5,100,000 lbs. and that of urea-formaldehyde resin as 9,000,000 lbs. with the last quarter of 1938 said to be the best in the history of the urea resin industry.

COFFEE PLASTIC. Business Week 33–4 (Jan. 28, 1938). South American interests are developing a process for making a plastic out of the 4,000,000-bag coffee surplus. Contemplated products include floor tile, wallboard, roofing material, and all the wide range of molded products to which synthetic plastics have been adapted. It is reported that the base for the plastic, plasticizer, and dyes in a full range of colors are obtained from the unroasted coffee bean.

STANDARD TESTS FOR PLASTICS. W. E. Emley. Industrial Standardization *10*, 38–40 (Feb. 1939). It has been possible to show that one type of plastic is better or worse than another simply by choosing appropriate test conditions. This situation has made for increased sales resistance and has hampered research work. The ASTM Committee on Plastics is working to develop standard methods of test so that everyone in the industry, producer and consumer, will be able to speak a common language.

INDUSTRIAL FIBERS AND THEIR POSSIBLE PRODUCTION FROM SYNTHETIC RESINS. David Traill. Brit. Plastics *10*, 488–94 (Feb. 1939). The protein fibers (silk and wool) are totally different in structure from the vegetable fibers (cotton and flax which are cellulosic and jute which is a lignocellulose). The relation of the molecular structure of these fibers to their physical properties is discussed. The production of superpolymers of various types (polyesters, polyamides, polyanhydrides, etc.) and their conversion into fibers in which the molecular chains are oriented parallel to one another by a process of spinning and cold-drawing are described. The requirements which a synthetic resin must meet to be suitable for fiber production are outlined.

Materials and Manufacture

BLEACHED LAC. N. N. Murty. Ind. and Eng. Chem. *31*, 235–9 (Feb. 1939). A discussion of factors which influence the keeping quality of bleached lac.

CELLULOSE DEVELOPMENTS, 1918–1938. J. D. Rue. Chem. Industries *44*, 28–9, 31–2 (Jan. 1939). A review of progress in applications of cellulose in the textile, paper, plastics, and explosives industries.

SOME ASPECTS OF THE VISCOSE INDUSTRY. G. S. Heaven. Chem. and Ind. (London) *58*, 66–9 (Jan. 28, 1939). A description of the production of synthetic fiber and film by the viscose process which is used for the conversion of cellulose into more than 86% of the world's output of rayon.

Molding and Fabricating

PLASTICS OVER METAL. C. H. Whitlock. Prod. Eng. *10*, 107–8 (Mar. 1939). The problems involved in the molding of plastics over metal are discussed. The process permits utilizing the strength and rigidity of steel plus the noise deadening, translucence, depth of color, softness and warmth to the touch, and other qualities of plastics not attainable by enamel finishing the metallic surface.

Applications

PLASTICS AS SUBSTITUTES FOR RUBBER, GUTTA-PERCHA, AND LEAD. Kunststoffe *29*, 47–8 (Feb. 1939). Abstracts of papers presented at a symposium dealing with the uses of plastics in insulating electrical wire and cable.

THE NEW WATERPROOFING. Chem. Age (London) *40*, 61–2 (Jan. 28, 1939). Methods previously used to waterproof fabrics consisted of (1) impregnating so as to block the interstices, making the fabric impermeable to both air and moisture and (2) coating the fibers with water-repellent substances, allowing the materials to remain porous to air, but relatively impervious to water. The first is unhygienic and the second is not very permanent to cleaning treatment. The "Velanization" process achieves waterproofing by a complete chemical transformation of the fiber surface. The "Velan" ("Zelan" in the U. S.) compound ordinarily used is octadecyl oxymethyl pyridinium chloride, $C_{18}H_{37}OCH_2N(Cl)C_5H_5$. Applied to cellulosic (HO-Cell.) material in the presence of sodium acetate it is believed to form $C_{18}H_{37}OCH_2N(O\text{-Cell.})C_5H_5$, which when heated splits off pyridine to yield the water-repellent compound $C_{18}H_{37}OCH_2O\text{-Cell.}$ The same result is obtained by the action of the quaternary pyridinium salt on silk and wool.

ELECTRICAL APPLICATIONS OF POLYSTYRENE. L. A. Matheson and W. C. Goggin. Ind. and Eng. Chem. *31*, 334–8 (Mar. 1939). Data are presented on the electrical, mechanical, thermal, and other properties of styrene resin. Application of styrene as the monomer and as the polymer in cast, molded, and solution forms to various industrial uses is discussed.

THE SWELLING OF WOOD. N. A. de Bruyne. Aircraft Eng. *11*, 44–6 (Feb. 1939). An analysis of the swelling resulting from absorption of various liquids and of the use of resins in preventing same.

MELAMINE IN CREASE-PROOFING TEXTILES. Rev. Gen. Mat. Plastiques *14*, 270 (Oct. 1938). Melamine, $C_3H_6N_6$, is a trimer of cyanamide, $CN\text{-}NH_2$. One dissolves 20 parts of melamine in warm water, adds 60 parts of 40% formaldehyde, and impregnates the textile with the mixture, drys at low temperature, and heats for a few minutes at 150° C. to produce a water-insoluble melamine-formaldehyde condensation product.

Coatings

HIGH TEMPERATURE APPLICATION OF NITROCELLULOSE LACQUERS. H. H. Nelson. Ind. and Eng. Chem. *31*, 70–5 (Jan. 1939). A saving in solvent consumption is effected by applying lacquers of high solids concentration at elevated temperatures which produce workable viscosities.

SURFACE COATING TRENDS. Wm. Krumbhaar. Paint Manufacture *9*, 11–5 (Jan. 1939). A discussion of special problems and materials developed to meet them. The effects of climatic conditions (sunlight, temperature, and humidity) on phenolic and alkyd resin finishes are considered. Alkyds are the more resistant to sunlight and high temperature, but the phenolics withstand better the action of high humidity, salt water, and acid gases.

Testing

PLASTOGRAPHIC MEASUREMENT OF POLYMERIC-HOMOLOGOUS CONDITIONS OF SYNTHETIC RESINS. M. Speitman. Brit. Plastics *10*, 447–53 (Jan. 1939). An apparatus is described for the determination of the fusing capacity, rate of flow, and rate of cure of synthetic resin compositions with a view to evaluating their suitability for molding.

Determination!

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STABILIZING RESINS. J. B. Hale (to Eastman Kodak Co.). U. S. 2,146,735, Feb. 14. Stabilizing polyvinyl acetal resins with hydroxylamine derivatives of salts thereof.

PLASTICS. G. Wilmanns (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,146,873, Feb. 14. Making plastics from aqueous solutions of proteins, cellulose derivatives or polyvinyl compounds and adding an amine having a straight chain aliphatic (hexyl or higher) radical.

INSULATION. Wm. H. Butler and E. H. Gross (to Bakelite Corp.). U. S. 2,149,805, March 7. Insulating electrical conductors with a primer containing a fatty acid modified alkyd resin, or a resin formed from formaldehyde and a phenolcarboxylic acid; and a protective coating containing an alkylphenol-formaldehyde resin.

POLYVINYL CHLORIDE. H. Fikentscher and W. Franke (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,147,154, Feb. 14. Interpolymerizing vinyl chloride with 0.5-3% of an acrylic acid or acrylamide derivative and treating the product with alkali.

PLASTICIZERS. C. Conover (to Monsanto Chemical Co.). U. S. 2,147,242, Feb. 14. Plasticizing cellulose esters, shellac or synthetic (alkyd, phenolic or vinyl) resins with neutral alkyl benzophenonedicarboxylates.

ACID SLUDGE RESIN. Wm. H. Carmody (to Neville Co.). U. S. 2,149,275, March 7. A bright, dark brown resin with brilliant fracture is obtained from the still residue left from distilling a mixture of acid sludge and still residues from by-product coke light oils.

MOISTUREPROOF FOILS. Wm. H. Charch (to E. I. du Pont de Nemours and Co.). U. S. 2,147,628 and 2,147,629, Feb. 21. Transparent wrapping foils are moistureproofed with a coating containing a wax and a resin (alkyd or vinyl) to give strength, adhesion and flexibility.

POLYAMIDES. G. D. Graves (to E. I. du Pont de Nemours and Co.). U. S. 2,149,286, March 7. Polyamides, from aliphatic diamines or polyamines and aliphatic polybasic carboxylic acids, are modified by heating the polyamide and its reaction components with a drying oil acid.

LACQUERS. W. E. Gloor (to Hercules Powder Co.). U. S. 2,147,697, Feb. 21. A cellulose acetopropionate or acetobutyrate lacquer, containing an alkyd resin modified with a nondrying oil or fatty acid, gives a weatherproof color-stable film.

PLASTICIZERS. G. S. Hooper (to E. I. du Pont de Nemours and Co.). U. S. 2,147,701, 2,147,702 and 2,147,703, Feb. 21. As plasticizers for esters such as cellulose acetate, 4-ketocarboxylic acids or 3-ketoalcohols or ketoesters such as diacetone acetate, diacetone levulinate, diacetone pyruvate, diacetone acetoacetate, diacetone propionate and the like.

THERMOPLASTIC COATINGS. G. Schneider (to Celanese Corp. of America). U. S. 2,147,757, Feb. 21. Thermoplastic (cellulose derivative, synthetic resin or chlorinated rubber) coatings are applied as a heated sheet to a hot base which has been impregnated with glycerol, glycol or a polyglycol.

ADHESIVE TAPE. E. L. Kallander (to Dennison Mfg. Co.). U. S. 2,147,772, Feb. 21. The coating for thermoadhesive tape comprises a polyvinyl resin blended with shellac and a fluxing resin (a modified alkyd); the other side of the tape is coated with a blend of a cellulose derivative and a phenolic, vinyl or alkyd resin.

AMINE-ALDEHYDE RESINS. G. D. Graves (to E. I. du Pont de Nemours and Co.). U. S. 2,147,789, Feb. 21. Condensing a dialkylaminophenol, a hydroxyquinoline or a hydroxyphenylmorpholine with formaldehyde.

ELECTRIC INSULATION. J. K. Webb (to International Standard Electric Corp.). U. S. 2,147,824, Feb. 21. Impregnating a tape or fabric sheet with liquid styrene and polymerizing the styrene in a bath of styrene to avoid vaporization losses.

RUBBER DERIVATIVES. H. A. Winkelmann and E. W. Moffett (to Marbon Corp.). U. S. 2,149,484, March 7. A resinous rubber condensation product is obtained by action of hydrogen chloride on rubber under pressure.

RESIN SHEETS. G. J. Esselen and E. R. Derby (to Monsanto Chemical Co.). U. S. 2,148,062, Feb. 21. Extruding a continuous web of polyvinyl acetal resin (containing no volatile solvent or plasticizer) through the slot of a die.

LUSTERING CHINTZ. A. L. Lippert (to Jos. Bancroft and Sons Co.). U. S. 2,148,316, Feb. 21. Imparting a permanent luster finish to chintz by treatment with a solution of urea-formaldehyde resin, which is then set by heat.

LIQUID PLASTIC. L. V. Slauter and H. Salter (to Michigan Cellulose Corp.). U. S. 2,148,381, Feb. 21. A liquid plastic comprises a solution of a cellulose derivative dissolved in acetone, isopropyl alcohol and toluene.

INFUSIBLE RESINS. A. Gams and K. Frey (to Ciba Products Corp.). U. S. 2,149,520, March 7. Acid condensation of anhydroformaldehydeaniline with formaldehyde to make a resin for use in molding powders.

LACQUER. E. H. Bucy (to Atlas Powder Co.). U. S. 2,148,601, Feb. 28. A cellulose ether lacquer is blended with a resin-in-oil varnish.

CHLORINATED RUBBER. J. W. Raynolds (to Raolin Corp.). U. S. 2,148,833, Feb. 28. Plasticizing hard, brittle chlorinated rubber with a blend of a high-boiling ether-ester solvent, a fluxing agent, a plasticizer and a high-boiling volatile solvent.

LEATHER SCRAP AS FILLER. A. R. Horowitz (to Webwood Corp.). U. S. 2,148,904 and 1,248,905, Feb. 28. Cooking leather scrap to a gel with alkali solution, precipitating with cold water, drying and powdering the precipitate and using the powder in cellulose acetate plastics.

HIGH VISCOSITY PRODUCTS. R. W. Maxwell (to E. I. du Pont de Nemours and Co.). U. S. 2,148,951 and 1,248,952, Feb. 28. Forming starch derivatives, having high viscosity, by cross reactions with bifunctional compounds; and forming high viscosity cellulose ethers by a similar reaction with bifunctional etherifying agents.

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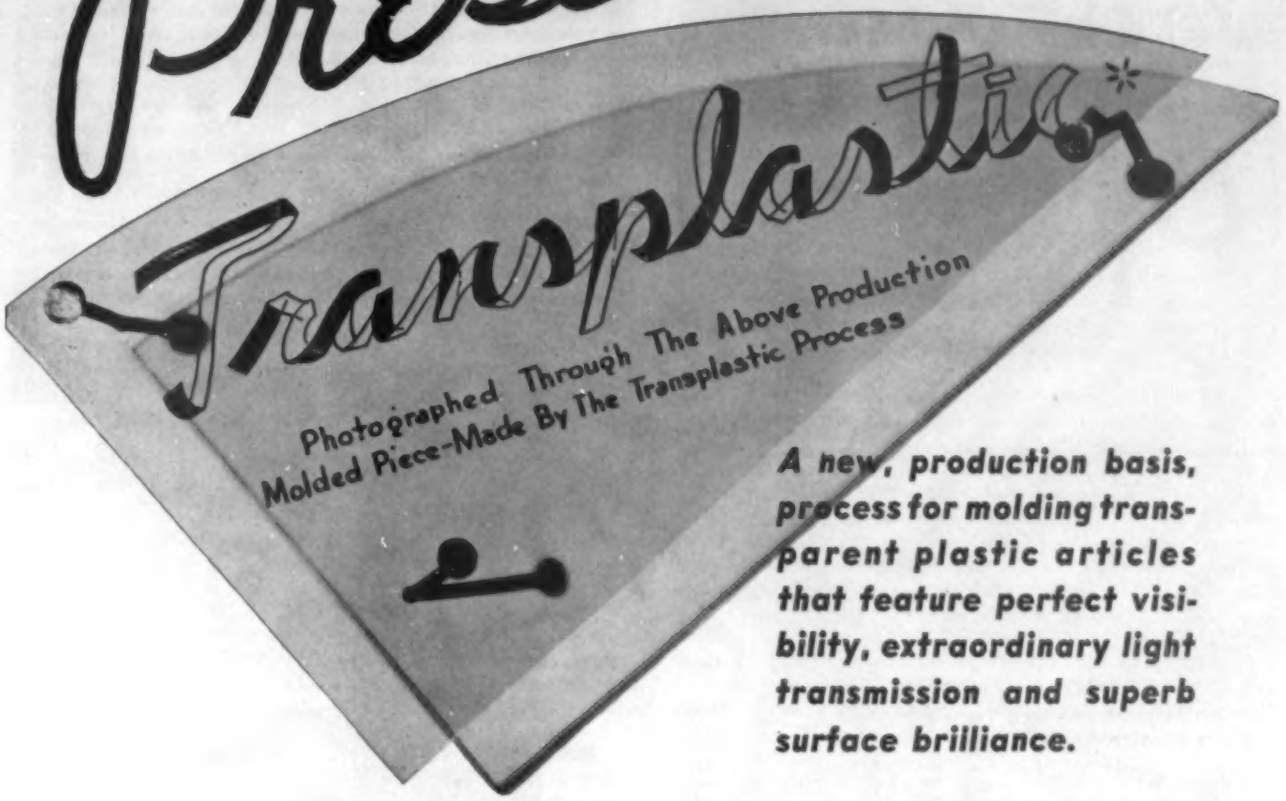

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Foreign Plastics Patents

Application dates are given for patents of European countries, but for Canada the issue date is given

INSULATED WIRE. Kabelfabrik-und Drahtindustrie-A.-G. Austrian P. 153,398, July 2, 1935. Wire, bare or wrapped in paper or silk, is wound with several layers of a cellulose or cellulose derivative foil, then coated with a cellulosic lacquer.

PHOSPHORESCENT RESIN. F. G. Jacob. Belgian P. 423,528, Sept. 9, 1937. Resins useful in luminescent varnishes or plastics are made by condensing a phenol with an aldehyde in presence of a catalyst prepared from a phosphorescent sulfide and a casein or starch derivative.

STABILIZING VINYL RESINS. Carbide and Carbon Chemicals Corp. French P. 829,713, Nov. 22, 1937. Vinyl interpolymers such as the resins derived from vinyl chloride and vinyl acetate are stabilized toward heat adding organometallic compounds such as tetrapropyl lead, tetraphenyl lead, tetrapropyl tin, tetraphenyl tin or the like.

SAFETY GLASS. Libbey-Owens-Ford Glass Co. French P. 827,410, Oct. 10, 1937. A polyvinylacetal resin, plasticized with a dialkyl sebacate, as interlayer in laminated glass sheets.

CELLULOSE ETHERS. Cellulose Holdings, Ltd. French P. 827,940, Oct. 15, 1937. Alkali-soluble, water-insoluble cellulose ethers which are useful in making films, foils or tubing and as fillers or coatings for paper, textiles or leather are made by etherifying fibrous cellulose with excess etherifying agent, then adding a cellulose hydrate gel to react with the surplus etherifying agent.

PLASTICIZERS FOR FOILS. Societe Anonyme Union Chimique Belge. British P. 493,813, Feb. 2, 1938. Plasticizing regenerated cellulose foils with water-soluble synthetic resins formed from glycols by complete or partial esterification with phosphoric acid.

FISHING RODS. W. B. Dickie, Jr., and F. E. Williamson. British P. 490,935, Jan. 23, 1937. Fishing rod shafts are made of a synthetic resin, or fabric impregnated therewith, supported by a metal reinforcement.

BUTTONS. Akalit Kunsthornwerke Aktiengesellschaft. British P. 487,037, Jan. 3, 1938. Flat articles such as buttons and buckles are made from artificial horn, e. g., casein plastics, by forming a pattern of the unhardened plastic, combining it with a differently colored plate of the plastic, and hardening both together.

CONDUCTING COATINGS. Steatit-Magnesia Aktiengesellschaft. British P. 487,839, Dec. 23, 1936. Conducting coatings are applied to mica by dispersing flakes of silver in a heat-hardenable resin and heating; the coated mica is useful in condensers.

PULLEYS. J. Wheway (to Lorival Mfg. Co.). British P. 488,295, Feb. 8, 1937. Pulleys are molded from a phenolic resin, around a ball bearing into which the resin is not allowed to penetrate.

CIRCUIT BREAKER TUBES. Allgemeine Elektricitäts-Gesellschaft. German P. 662,151, May 16, 1936. Flash extinguisher tubes for circuit breakers are made by slicing a block of cellulose hydrate sponge, impregnating the resulting sheet with urea-formaldehyde resin, winding in cylindrical form and hardening.

ALKYD RESIN. H. S. Rothrock (to E. I. du Pont de Nemours and Co.). Australian P. 103,585, April 3, 1937. An alkyd resin with low acid number and good solubility in organic solvents is obtained by treating an acidic alkyd resin with ammonia, then condensing with formaldehyde. The products have good compatibility with cellulose derivatives and other resins in coatings.

FLAMEPROOF FOILS. British Sidac, Ltd. British P. 490,542, Feb. 18, 1937. Transparent foils made of gelatin, casein or a cellulose ether or hydrate are flameproofed by impregnation with an amine phosphate, e. g., diethanolamine orthophosphate.

GASPROOF FABRICS. Paul Nowak (to Allgemeine Elecktricitäten-Ges.). German P. 664,631, March 1, 1934. Fabric for gas masks or for gasproof garments is impregnated with a polyacrylic acid resin and coated with cellulose triacetate.

MOLDED INSULATION. I. G. Farbenindustrie Aktiengesellschaft. French P. 831,764, Jan. 7, 1938. Molded insulation having high thermal stability and resistance to surface discharge is made by condensing heterocyclic bases with formaldehyde.

FLOOR COVERINGS. I. G. Farbenindustrie Aktiengesellschaft. British P. 487,323, Dec. 15, 1936. Resins for floor or wall coverings are made by condensing mono- or dithiodiethyleneglycol, or trithiodi-tetramethyleneglycol with maleic, succinic, phthalic or citric acid.

SOUND RECORDS. F. Neumann and A. Dengler. British P. 484,434, April 22, 1937. Blanks for sound records are built up from successive layers of different cellulose derivatives (nitrate, acetate, ethyl or benzyl ether, etc.), and hardness is progressively increased toward the center by increasing the resin content from top to center.

HIGH GLOSS CONTAINERS. International Containers, Ltd. Danish P. 55,121, May 7, 1937. Cellulose acetate containers are made by dipping a rigid core one or more times in the acetate solution, then soaking in warm water until the container will come loose from the core, which may be wetted with castor oil or other lubricant before dipping.

INSULATION. C. Lorenz Aktiengesellschaft. French P. 833,044, Feb. 1, 1938. Making molded electric insulation of 65% quartz (to keep down dielectric loss), 32% phenol-formaldehyde resin and 3% olein (to prevent sticking to the mold).

HEAT-CONDUCTING INSULATION. Licentia Patent-Verwertungs.-G.m.b.H. Swiss P. 197,963, June 2, 1936. Electric insulation is made of an acrylate ester resin with up to 85% of a heat-conducting inorganic filler, e. g., a mixture of quartz and asbestos.

ABRASIVES. Carborundum Co. British P. 491,658, and 491,659, March 6, 1937. Paper, cloth or metal foil is coated with diamond or boron carbide particles, placed in a mold with the abrasive face turned in, the mold is filled with a phenol-aldehyde resin containing particles of alumina or flint, and the assembly is molded; or abrasive grains are mixed with molten copper, silver, iron, nickel or cobalt, the cooled melt is granulated and molded into disks with a phenol-aldehyde or vinyl acetate resin as binder.

RESINS FOR MOLDING. N. V. W. A. Scholten's Aardappelmeelfabrieken. Holland P. 44,240, May 6, 1936. Condensing aniline with starch, drying the product, adding a filler and molding to form insoluble, infusible articles.

MOLDS FOR RESINS. R. T. Fields (to E. I. du Pont de Nemours and Co.). British P. 490,757, Feb. 19, 1937. Molds for polymerizing methyl methacrylate and like polymerizable liquids are made of lead alloyed with 0.5–7% of tin.

SOUND TRACK FILMS. N. V. Philips Gloeilampenfabrieken. French P. 833,728, Feb. 14, 1938. A film for recording sound mechanically is made of ethylcellulose, benzylcellulose, nitrocelluolse or cellulose acetate, superficially hydrolyzed with aqueous alkali.

Phenoform Colors

GDC

A wide range of colors for plastic compounds — especially selected and prepared to meet the most exacting requirements in molding. For particulars apply to

General Dyestuff Corporation

435 Hudson St., New York, N. Y.

Secure Highly Reflective Lustre By Finishing Plastics With the 3-M SYSTEM . . . .

Use the 3-M System for faster and better results when removing flashings, mold parting lines, knife and saw marks, sprue or gates and for properly preparing the surface. Polishing is made easier and a uniform highly reflective final finish improves the appearance of your product.

When sanding therma plastics you stop flowing or burning and all dust is eliminated.

The 3-M System is easy to use and represents the latest developments in finishing plastics and hard rubber molded products.

A circular is available with complete details —why not write for it today.

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Gentlemen, please send your circular "WTC"
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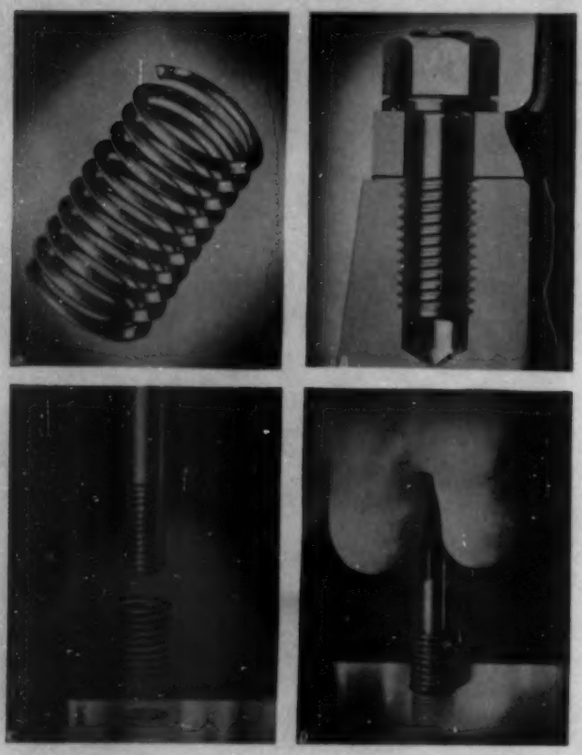
MINNESOTA MINING & MFG. COMPANY

SAINT PAUL — The Desire To Serve — MINNESOTA — The Ability To Produce

Equipment

AIR ASSOCIATES, INC., HAVE RECENTLY PERFECTED A NEW device particularly applicable where the maximum reliability in screw fastenings is required. It is the new "Aero-Thread" Screw Thread System, shown below, which features use of a spirally wound insert or bushing of precision-formed bronze spring wire in which hardness, strength, surface smoothness and anti-frictional qualities are carefully controlled. The insert is screwed into the tapped hole and forms the seat for the screw, effectively protecting the threads from wear and resulting in a stronger thread with a hard, smooth surface into which the screw fits smoothly. The hole is tapped with an Aero-Thread Tap; the insert is screwed into the hole; the stud or cap screw is then screwed into the insert. Inserts fit into the tapped hole and lock firmly in place, becoming a fixed part of the tapped hole, yet replaceable if damaged.

The first application of the "Aero-Thread" system has been in the aircraft industry where high strength studs and cap screws are required,

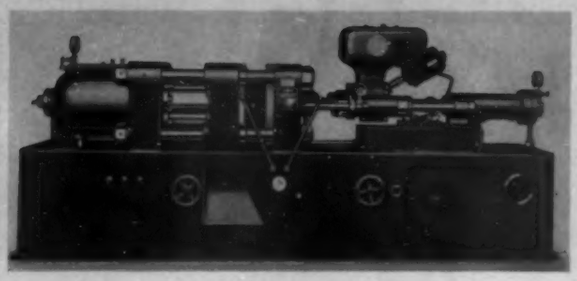


but because of its high strength and greater shock resistance, this screw system is attractive for use in all machinery where compactness and light weight is desirable and has universal application to all threaded parts.

"Aero-Thread" alloy steel cap screws and studs are treated to a minimum tensile strength of 150,000 lbs. per square inch and are offered in all standard diameters and lengths.

NEW TYPE PAUSE PREFORM PRESSES HAVE RECENTLY BEEN developed by the Kux-Lohner Machine Co. for tableting materials that are hard to compress and where the density of the tablet must be held uniform. In this press the tablet is held under compression during a pause period equal to approximately 25 percent of the entire time cycle, thus giving the material time to flow and set while under pressure.

THE PROCESS TIMER RECENTLY INTRODUCED BY POTTER & Brumfield Mfg. Co., Inc., is particularly useful for timing molding operations. It is set by hand, works on alternating current only, and is being made in different types for specific purposes.



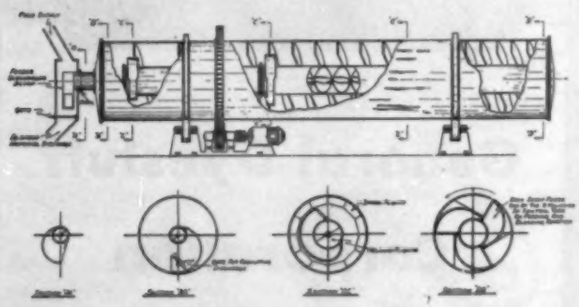
TO MEET A TIMELY DEMAND FOR INJECTION MOLDING presses of 7 ounces and 9 ounces per shot capacities, The Hydraulic Press Manufacturing Co. introduces its latest developments—the Model 200-H-7 and the Model 200-H-9 (above). These presses are reported to include all of the desirable and proven principles of modern design and construction incorporated in other H-P-M injection molding presses which make up the complete line—plus several new and distinctive improvements to further advance the efficiency of injection molding.

These new models are complete self-contained presses of the horizontal clamp type. In appearance, they follow the most advanced practice of modern designing expressing compactness and neatness, with all operating mechanism totally enclosed but readily accessible. They are ideal for large and small production runs—with small job lots receiving equal consideration because molds may be changed quickly and no fine adjustments are required in changing over from one job to another.

The material hopper has a 50 pound capacity. The material is forced fed through passages by means of a feed screw driven by an electric motor with the feed automatically regulated. Both presses are equipped with manual, semi-automatic or full-automatic control.

A NEW GENERAL PURPOSE SWITCHING MECHANISM EMploying the G-E "Mercury Button" designed for installation on electric applicances, etc., was recently announced by the General Electric appliance and merchandise department. This mechanism makes the silent and long-lasting switching element, used first for wiring systems, adaptable now for practically every type of electrical product. The mercury button consists of mercury-to-mercury contacts enclosed in two special alloy metal disks which are glass-sealed on a ceramic barrier. Hydrogen gas prevents oxidation of mercury and cools and quenches the arc when the circuit is broken.

THE THWING A5X PYROMETER, MANUFACTURED BY Thwing-Albert Instrument Co., gives exact control of heating and pouring metal, eliminating to a large extent casting losses in foundry work. Temperature readings are obtained in eight seconds. This practical pyrometer is equipped with extensible magazine thermocouple and uses bare wire junction. Although a scientific tool, it is simple and easy to use, enabling foundrymen to check exactly the correct temperature at which to pour the metal for every mold.

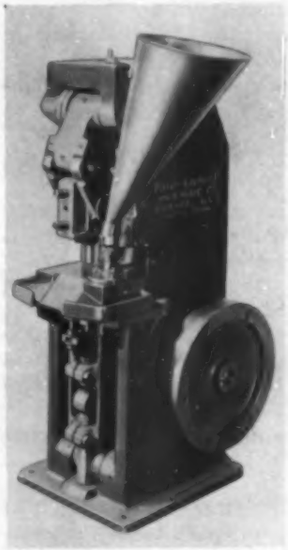


THE PATTERSON TRIPLEX DRY BLENDER, EMPLOYING AN entirely new principle of mixing and blending of dry materials is announced by the Patterson Foundry and Machine Company and illustrated above. The basic principle of operation is the division of the material into thirds by geometric progression, and also rapidly mixing the material simultaneously by the rotation of the cylinders.

A BATTERY OF GORTON SUPER-SPEED MILLERS
at the CHICAGO MOLDED PRODUCTS CORPORATION

Our compliments to the new establishment of the Chicago Molded Products Corporation . . . one of the most modern plants operating in the plastics field. Fully equipped, of course, with Gorton super-speed Milling Machines, and every machine in constant use as shown in this unposed photo.

GEORGE GORTON MACHINE COMPANY, RACINE, WISCONSIN

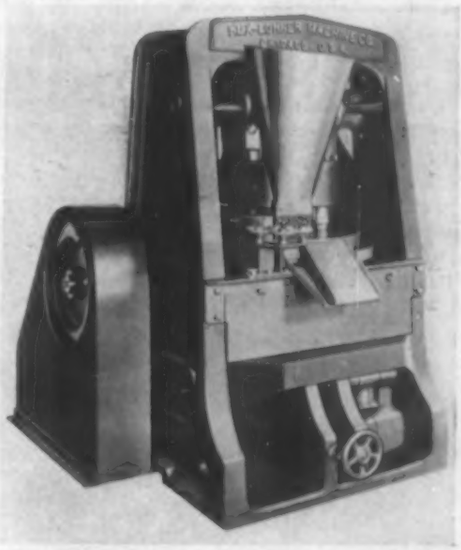


Single Punch—Pause Type

KUX HI-SPEED PREFORM PRESSES

MODERN MACHINES
FOR
MODERN PLANTS

Chosen by Chicago Molded Products Corp. for Their New Custom Molding Plant



Six Punch Rotary—3½" Diam.—4" Fill

Every day more and more modern molding plants are turning to "Kux" for their preforming equipment. The reasons are many—Alloy Steel Box Shaped One Piece Main Frames—Pressures up to 200 tons.

Send for Our Catalog

Full range of machines in both single punch and rotary models to meet every preform size requirement—Compression from both sides of tablet—Simple and practical overload release spring—Easier and quicker punch and die set-up.

All Machines Completely Covered by Patents

KUX-LOHNER MACHINE CO.—2145 LEXINGTON ST.—CHICAGO

Publications

Write for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery. Other books will be sent postpaid at the publishers' advertised prices.

The Chemical Formulary

edited by H. Bennett

Published by Chemical Publishing Co., New York, Vol. IV—1939 edition

Price $6.00 **638 pages**

It is amazing how much new material can be gathered from year to year to keep this invaluable reference book up to the minute with new formulas and recipes of interest to such a wide reading audience. Photography, liquors, oils and fats, insecticides, lubricants, dyes, plating, pyrotechnics and explosives, drugs, adhesives, rustproofing, farm and garden specialties, rubber and latex, lacquers and paints, cements, polishes, textiles and fibers, resins and synthetic resins, and many other important chemical and industrial materials and methods are described. The book is not one of formulas alone, but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. E. F. L.

Processes and Machinery in the Plastics Industry

by Kurt Brandenburger

translated by H. I. Lewenz, M. I. Mech. E.

Published by Pitman Pub. Corp., New York, N. Y. (Printed in England)

Price $6.00 **243 pages**

The book makes no claim to being a scientific treatise on the chemistry of resins and allied compositions, but represents a clear effort to reveal some of the more important developments and processes of a rapidly growing industry which the author feels are too commonly held in secret. Many processes and much machinery are described in detail in the hope that readers may become better acquainted with the industry and its complicities. The experiences detailed come largely from Germany and England since the work is a translation of Vols. I and II of K. Brandenburger's *Herstellung und Verarbeitung von Kunstharz-pressmassen*, 1st edition, 1934. E. F. L.

17th Art Directors Annual of Advertising

Published by Longmans, Green & Co., New York

340 Illustrations. 8 Color Plates. 186 Pages. **Price $5.00**

This is an important book, not that it has anything to do with plastics but because it points the way to advertising profits for those who make and sell plastic materials and products. It is an amazing exhibit of the power of art as a selling aid. It reveals in brisk concise text and illustration just how fast advertising procedure has progressed during the past year.

The book was designed by Lester Beall along lines that bring out its maximum usefulness in all fields of the graphic arts. It is divided into six sections, five of which correspond to the five major kinds of advertising media, and the sixth is devoted to typography and layout. The 340 illustrations are from the Art Directors Show held in New York, Chicago and Philadelphia in the Spring of 1938. E. F. L.

THE NEOPRENE NOTEBOOK, PUBLISHED BY THE RUBBER Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, in a recent issue discusses the superior resistance of rubber-fabric belting to severe atmospheric conditions. Another item of interest is the "vibration dampener" for spectacles which protects rimless glasses from shock and strain.

A Philosophy of Esthetics

by Dale Nichols

The Black Cat Press, Chicago

Limited Edition—numbered and signed

Price $7.50 **84 pages**

This is not a momentous work but the author explains logically why we react as we do to color and form and for that reason, the book is worthy of reading by executives who always choose "red" as a color for their product or advertisement because they "want to get attention." The attention their product gets because it is "red" may be quite the reverse of what they have in mind. The author likens man to a radio receiving set and proceeds to outline the technique required to cause him to tune in to the thing you want him to read or buy. The text explains art and its application to industry and typography in the simplest terms and the illustrations exemplify the author's profound knowledge of his subject by clearly demonstrating each device as he goes along. A good book for designers, students and executives whose product needs design to sell. E. F. L.

Design of Industrial Exhaust Systems

by John L. Alden

Published by The Industrial Press, New York, N. Y.

Price $3.00 **220 pages**

In one of the most complete books ever published on the subject Mr. Alden, who is a member of the A.S.M.E., tells engineers how to design, build or buy an exhaust system that will successfully and economically perform the requirements prescribed by industrial hygiene experts and by law. The book covers flow of fluids, hood forms, air flow, pipe resistance, piping design, dust separators, low pressure conveyors, exhaust fans and system planning. E. F. L.

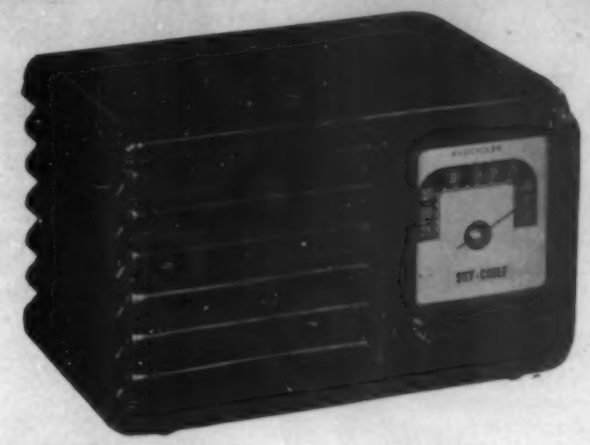
THE LATEST EDITION OF THE INDEX TO A.S.T.M. STANDARDS and Tentative Standards gives information on all of the 870 standards as of January 1, 1939. The Index is of service to anyone wishing to ascertain whether the Society has issued standard specifications, test methods, or definitions covering a particular engineering material or subject and it is of help in locating the standards in the volumes where they appear. Copies of this publication are furnished without charge. Write to A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia.

THE UNITED CINEPHONE CORP., 43-37 RAWSON STREET, Long Island City, New York, has published an interesting booklet titled "Marvels of the Electric Eye." The booklet describes the process of photoelectric control through the use of a beam of light and indicates how it may be used on conveyors, for automatic lighting, burglary protection, automatic cut-offs, hopper control for automatic batch weighing, detecting missing labels and liquid heights, color sorting, grading for size and other adaptations where this scientific device is employed to improve engineering technique and production.

COST ACCOUNTING IN THE PLASTIC MOLDING INDUSTRY, BY Robert W. Peden, is an intensely interesting and valuable paper prepared to illustrate the benefits of a cost program for a small, rather than a large corporation. It outlines the procedure which may be followed in setting up rates and standards in a new company with practically no historical background. It explains the adaptation of proved techniques to a new and rapidly growing industry, namely, the plastic molding industry. It indicates the value of a cost accounting program as a diagnostic or fact-finding agency whereby favorable and unfavorable trends both in manufacturing processes and in sales policies may be identified, measured and controlled.

The business described is that of the Detroit-Macoid Corp., and the article appears in N. A. C. A. Bulletin, Section I, January, 1, 1939. The Bulletin is published semi-monthly by the National Association of Cost Accountants, 385 Madison Ave., New York. (Subscription $10.00.)

ANOTHER EXAMPLE



of Custom Molding

BY UNIVERSAL PLASTICS CORP.

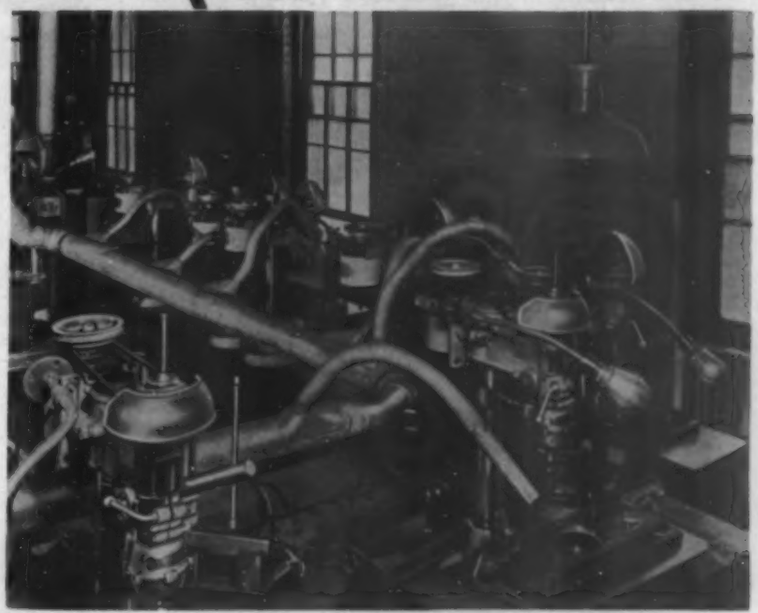
This distinctive and richly appealing radio cabinet was recently added to the popular "Sky-Chief" line . . . molded with skill, experience, and practical knowledge at UNIVERSAL PLASTICS. Our newest model high speed presses will mold any plastics material for you at low cost regardless of quantity . . . large or small . . . required. Write or phone today for our suggestions and full information.

235 Jersey Avenue,

NEW BRUNSWICK, N. J.

How To Cut YOUR EQUIPMENT COSTS

Do you want to speed up production and reduce costs—without investing many thousands of dollars for new machinery? Here's a practical suggestion: There are many operations in your shop that can be handled more efficiently and economically by low-cost tools—by Delta drill presses that cost from $26 to $275, Grinders, from $46 to $84, Sanders at $18.85. Thousands of America's leading industrial concerns, including the largest, are using Delta low-cost tools to cut their equipment costs. Plastic plants, huge automotive factories, aviation and motor plants, small part makers—every conceivable type of manufacturing plant is found on the list of Delta low-cost tool users. If these concerns can use low-cost tools to advantage—so can you!



SEND FOR CATALOG
giving list of users, detailed descriptions of the complete Delta line and prices—and full information on how you can try any Delta tool in your shop without cost or obligation.

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MFG. CO. (Industrial Division)
680 E. Vienna Ave. Milwaukee, Wis.

Industrial Division
Delta Mfg. Co., 680 E. Vienna Ave.
Milwaukee, Wis.
Gentlemen: Send me latest Delta Catalog.
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News

SPRING MEETING OF THE SOCIETY OF THE PLASTICS INDUSTRY is to be held at Westchester Biltmore Country Club, Rye, New York, on May 14 through May 16.

WILLIAM T. CRUSE, CELLULOID CORP., SAILED THE MIDDLE of last month for a six weeks' trip abroad. Combining business with pleasure he planned to visit England and the Continent to observe conditions and see what is going on in the molding industry, especially with regard to thermoplastics.

THE IMPERIAL CHEMICAL INDUSTRIES LTD., GREAT BRITAIN, has recently announced the production of a new fire resistant finish to be used for protection against incendiary bombs and fire. The new product is known as "Pioneer Fire Resistant Finish, A.R.P. Grade." The manufacturers state that this product is made from anhydrite and is supplied in the form of a light grey powder which is added to water and sprayed or painted on the woodwork or other combustible material which it is desired to protect. Imperial Chemical Industries Ltd. recently demonstrated a film which recorded an experiment made with the new product. Three models, each about one-fifth of full scale, were made to reproduce, in the words of the manufacturers, "in the simplest manner the edge and surface conditions encountered in the average domestic attic space with exposed boarding and roof timbers." One of these models was left untreated; the other two were coated twice on their inner surfaces with limewash and "Pioneer" finish, respectively. An incendiary bomb weighing about half the standard weight was exploded in each model. The two which had not been treated with new fire-resistant burned to destruction in 20 minutes, but the other model which had received the new treatment emerged unscathed apart from some blistering and scorching. (American Consulate General, London)

CARL HOLMES, FORMERLY CONNECTED WITH QUARMSTROM Tool of Detroit, Michigan, wishes to advise his many friends in the plastics industry that he is now associated with R. H. Freitag Co. of Akron, Ohio, who has recently enlarged its plastic die division.

GENERAL ELECTRIC CO. ANNOUNCES IMPROVED ECONOMICAL hinge for plastic boxes and containers. Sturdiness, durability and smooth action in opening and closing are secured by a patented roller-pin spring construction. This device prevents misalignment or twisting and operates without squeaking. The angle of the cover opening and the spring tension desired can be designed to meet manufacturers' production requirements. (Illustrated below.)

THE ESTABLISHMENT OF THE PLASTIC PRODUCTS MANUfacturers Association, Inc., with headquarters at 1133 Broadway, New York, is announced by Abraham Edelman, executive director. The purposes of the Association are to promote, develop and improve business standards within the industry; create and maintain standards of fair competition and set up means of administering and enforcing them; to deal with individuals collectively or with other organizations for the purpose of arriving at suitable agreements for the industry; to adjust and arbitrate disputes, differences and grievances among members or between members and others, and to set up impartial machinery for the adjustment and settlement of these disputes.

The Association has filed with the Wage and Hour Commission under the Fair Labor Standards Act of 1938, a petition for the appointment of an Industry Committee to set a fair minimum wage for employees in order to stabilize the cost of production among manufacturers.

The Plastic Manufacturers Credit Service, which conducts a collection and credit service exclusively for the Plastics Industry, is affiliated. The Association extends an invitation to all to communicate with it and to submit suggestions, criticism and advice to effectuate its aims.

FRITZ A. DEGENER HAS RECENTLY BEEN APPOINTED MANager of the Chicago sales office of the Heyden Chemical Corp., having been a member of their New York and Chicago sales staff for a number of years. He succeeds H. C. Ellis, who recently retired from active business after serving for more than thirty-six years as Heyden's Chicago representative.

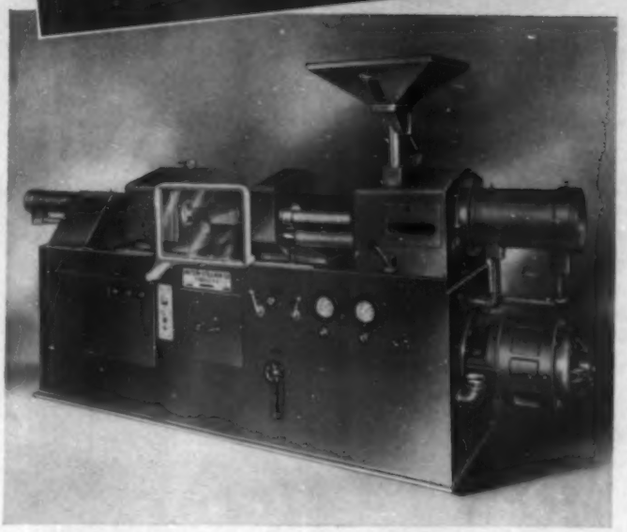
TWO NEWLY FORMULATED, ASBESTOS-FILLED DUREZ MOLDing materials have recently been made commercially available by General Plastics, Inc., North Tonawanda, N. Y. Several advancements over others of their type previously offered have been incorporated into these new materials. One was formulated specifically to meet Underwriters' specifications of withstanding 200° C. for 72 hours. It also has an Impact Strength of .23 (ASTM) and a Compressive Strength of 28,000 (ASTM). Heat Resistance is 490° F.; Specific Gravity, 1.80.

The other has an exceptionally low Specific Gravity for asbestos-filled molding compounds—1.59. It has a slightly higher Heat Resistance, 500° F., but a lower Impact Strength—.19 (ASTM). However, its Flexural Strength of 9000 (ASTM) is greater than for any previously available. Compressive Strength is also 28,000 (ASTM).

C. E. WALTMAN AND ASSOCIATES, INDUSTRIAL DESIGNERS with headquarters at 737 North Michigan Avenue, Chicago, have acquired additional space and personnel to expedite their present increase in business. William G. Connelly, formerly with the Wilterding Company, will head the package designing division.

IN THE PLEXIGLAS COMPETITION SPONSORED BY THE RÖHM & Haas Co., Inc., Philadelphia, and the Museum of Modern Art, New York, as announced in the January issue of Modern Plastics, five sketches from 250 entries were chosen to be executed in Plexiglas. The judges, Katherine S. Dreier, Robert Laurent and James Johnson Sweeney, all of New York City, assisted by Gilbert Rohde acting as technical ad-

WASCO . . . INJECTION MOLDING MACHINES



The No. 6 WASCO Automatic Injection Molding Machine has created widespread interest because of design and construction features that assure faster operation — increased production — new operating economies.

For instance, the clamping mechanism, which is of an improved type, affords positive clamping of dies having up to 75 sq. in. projected area.

The maximum opening between die plates is 24", with an adjustment of 0" to 18" on the clamping end. There is no extra charge for this exceptionally large opening.

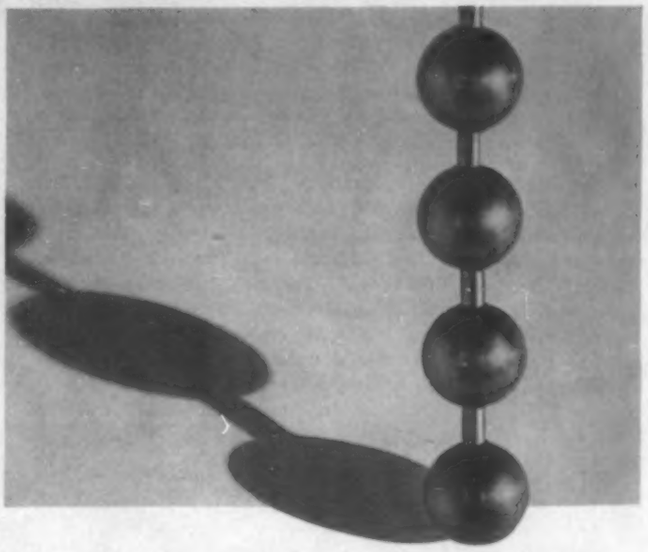
The bore of the heating cylinder is smooth and of uniform diameter. There is absolutely no place for material to lodge. This is a distinct advantage when changing from one color to another.

These are but a few of the exclusive features of the WASCO Injection Molding Machine.

For further information and detailed specifications write The Watson-Stillman Co., 118 Aldene Road, Roselle, New Jersey.

WATSON STILLMAN

INGENUITY



BEAD CHAIN*

Because it can not kink, is strong and adds beauty to a product, BEAD CHAIN* is today widely used as a merchandising factor.

On screw caps, wherever they are used; for regulator controls on fixtures in many fields, especially where appearance is important; for captive pencils, pens and reference books—these are examples of ingenuity where BEAD CHAIN* has been advantageously applied.

BEAD CHAIN

ESTABLISHED 1914

Trade Mark Reg. U.S. Pat. Off.

It is made of various metals in sizes from 3/32" to 3/8" diameter beads, with couplings and attachments to suit. Our experience of 25 years is at the disposal of manufacturers for developing new and practical uses of BEAD CHAIN* with their products.

THE BEAD CHAIN MANUFACTURING CO.
60 Mt. Grove St. Bridgeport, Conn.

* Reg. U. S. Pat. Off.

visor, made no attempt at this time to award specific prizes. The awards will be made late in April on the basis of executed designs and the sculpture of the winner will be shown in the Exhibit of Röhm & Haas in the Hall of Industrial Science, Chemicals and Plastics at the New York World's Fair.

Artists, whose sketches were chosen for execution, are: Alexander Calder, New York; C. K. Castaing, Stony Brook, L. I.; Werner Drewes, New York; Herbert Matter, New York; and Xanti Schawinsky, Edgewater, New Jersey. Harold Barnett of New York City and Lawrence E. Roberts of Pasadena, Cal., received Honorable Mention.

A RECENT ANNOUNCEMENT OF THE ABBÉ ENGINEERING CO., New York City, gives details of their Rotary Cutters for the chemical, drug, plastics, rubber and allied industries, including the Abbé Laboratory Rotary Cutter for use in cutting up small quantities at a fast rate and in preparation of materials for analysis in laboratory work. It is especially adaptable to cutting scrap cellulose flash for reuse.

WE WERE SHOCKED TO LEARN OF THE SUDDEN DEATH ON March 31st of Prescott Huidekoper, President of the American Insulator Co., New Freedom, Pa., and first president of the Society of the Plastics Industry. Mr. Huidekoper was a pioneer in the field of plastic molding and at the time of his death, headed one of the oldest and most progressive molding plants in the country. As a young man out of Harvard University, his urge to try new things led him into such diversified paths as farming in the hills of West Virginia, commanding a machine gun battalion in France during the World War, then back into horticulture after the armistice was signed and finally into plastics with American Insulator Company.

HOOPES, CUNNINGHAM AND McKINNEY, INDUSTRIAL DEsign consultants, have recently enlarged their staff and removed their offices to 12 South 12th Street, Philadelphia. The services of this group include the design of industrial and technical products from the standpoint of both function and appearance.

THE HYDRAULIC PRESS MANUFACTURING COMPANY, BUILDers of the H-P-M Hydro-Power Fastraverse presses, recently licensed The Birdsboro Steel Foundry & Machinery Company to use the H-P-M Fastraverse system of operation in connection with three presses for foreign shipment. The operation of the system may be either manual, semi-automatic or automatic depending upon the requirements of the work. Manual operation is usually used for die set-up or change-over in preparing the work for production. The use of semi-automatic or automatic operation depends entirely on the nature of the work done.

MANUFACTURERS ARE INVITED TO SEND NEW PRODUCTS TO our editorial office for possible mention in the publication and for display in our exhibit of plastics maintained at 122 East 42nd Street, New York City. They will be placed on display during the month of their appearance in the magazine, then will be returned. There is no cost or obligation for this service which mutually benefits the manufacturers and our readers. Such items should be directed to the attention of the editor.

THE KNOEDLER COMPANY, LANCASTER, PA., HAS ANnounced a new plastic called Gemstone which is available in standard size rods, sheets and tubes for fabricating. It is a casting resin of the phenolic type but unlike any others on the market it is claimed because it is a combination of resins rather than a pure phenolic. Through this new combination of resins, the company is enabled to guarantee consecutive shipments of material without variation of color.

The material may be cast in a multitude of various shapes and special forms according to demands and may be sawn, drilled, turned and otherwise handled like any cast resin.

PROMOTION OF VICTOR E. WILLIAMS, MANAGER OF THE New York sales branch of Monsanto Chemical Company, to assistant general manager of sales was announced recently by G. Lee Camp, vice president. In his new position, Mr. Williams will divide his time between New York City and the Saint Louis headquarters of Monsanto.

A. T. Loeffler, who has been assistant manager of the New York branch, has been promoted to the managership to succeed Mr. Williams. F. C. Renner, assistant general manager of sales, Merrimac division of Monsanto, Boston, has been promoted to succeed Mr. Loeffler.

THE TWENTY-FIFTH ANNIVERSARY OF THE BEAD CHAIN Manufacturing Co., Bridgeport, Conn., was celebrated there on March 17, 1939. The company produced the first chain of its kind to be made in America and has made outstanding progress in developing uses for its product. The company is now housed in a modern four-story reinforced concrete building, pictured above. Founded in 1914 by Waldo Calvin Bryant, the present list of officers includes: W. G. Bryant, W. D. Blatz, David S. Day and David S. Ross.

AFTER FIVE YEARS OF ACTIVE WORK IN CHARGE OF SALES of the Oil Soluble Division of General Plastics, Inc., No. Tonawanda, N. Y., Dr. Stephen C. Babcock has decided to retire. However, his fund of information will not be lost completely to the trade for he will continue to act in a consulting capacity for General Plastics, Inc.

Charles T. O'Connor, who has been in charge of the Chemical laboratory of this division for the past seven years, has been appointed head of the Oil Soluble Resin Division. He has already assumed his new duties, which include the direction of sales.

THE F. J. STOKES MACHINE CO., PHILADELPHIA, MANUFACturer of plastics molding equipment, announces the appointment, in four additional territories, of representatives to handle Preforming Presses, Standard Toggle-type Molding Presses and Stokes Completely Automatic Molding Machines. These representatives are, in Chicago, Robert Platt, 20 North Wacker Drive; Detroit, Thomas Redmond, 214 Chalmers Ave.; Cleveland, Cleveland Duplex Machinery Co., West Third and Lakeside Aves.; St. Louis, Martin Tieman, 24 So. First St. These representatives are prepared to consult with users and prospective users of plastics and make Molding Cost Studies on parts that are now molded, machined, stamped or die-cast.

PLASTIC PRODUCTS CO., 580 MARKET ST., SAN FRANCISCO, Cal., announce that they have arranged for space at the Golden Gate International Exhibit where molders and materials manufacturers may exhibit their products on a rental basis. This planned exhibit will make it possible to test public interest in new products since names of interested inquirers will be mailed to cooperating exhibitors weekly on a rate basis, they report.

A NEW LAMINATED EXTRUSION PROCESS WAS REVEALED BY Ebonestos Industries Ltd., London, at their exhibit stand in the British Industries Fair. Although details of the process are lacking, it is reported that continuous laminates of any length are possible. The woven fabric was definitely visible in the samples displayed and appeared to be all in one continuous piece. The material apparently possesses the same strength as ordinary laminates and it can be formed in shapes other than flat sheets.

COMBINED OPTICAL INDUSTRIES LTD., LONDON, ARE PROgressing with molded lenses of acrylic resins. It is reported that at their booth at British Industries Fair they had no difficulty in proving that their lenses do not scratch easily. They simply bounced them on the concrete floor and left the decision to the audience.

We're Close to Raw Material Sources, Too!

Within 37 miles we have available every type of molding compound to meet your requirements. This means the quickest possible service on raw materials . . . . faster delivery of finished moldings . . . . and lower transportation costs. All these are factors to be reckoned with in placing your next order. Let us figure on it?

JOSEPH STOKES RUBBER CO.

Gen'l Offices: 322 WEBSTER ST., TRENTON, N. J. Plants: TRENTON, N. J. and WELLAND, ONT.

MOLDERS OF ALL PLASTICS—Including Hard Rubber—SINCE 1897

The most modern molding press will be inefficient

UNLESS . . .

A COLTON PREFORMING

machine backs it up!

Colton Preforming Machines are the accepted standard in the plastics industry not only because they speed up the molding cycle but because their unvarying accuracy of performance is a guarantee of better molding at the press. When Colton preform-pellets are used material waste is eliminated, flash is held to the ideal minimum, material handling problems are simplified and costs d

r
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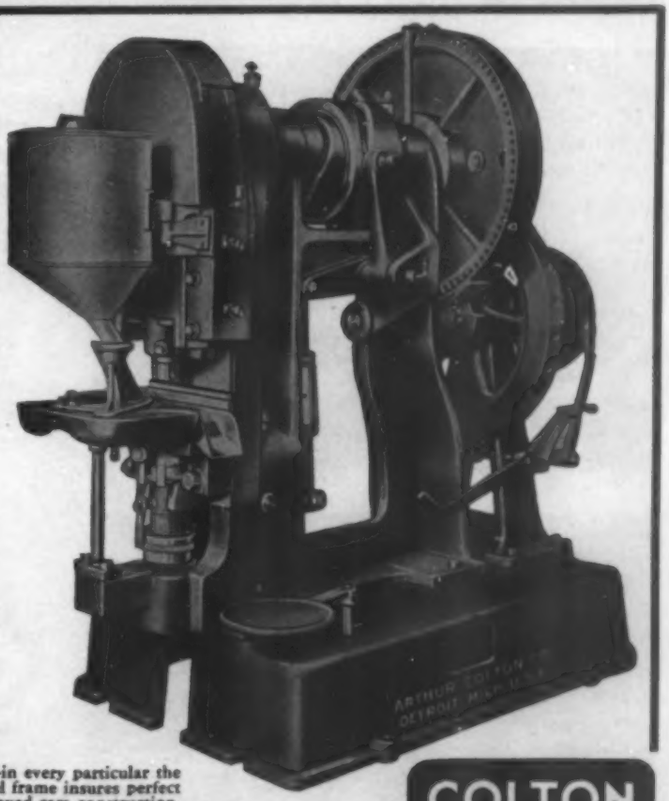
p

Write us for full details about our complete line of single punch, multiple and rotary preforming machines.



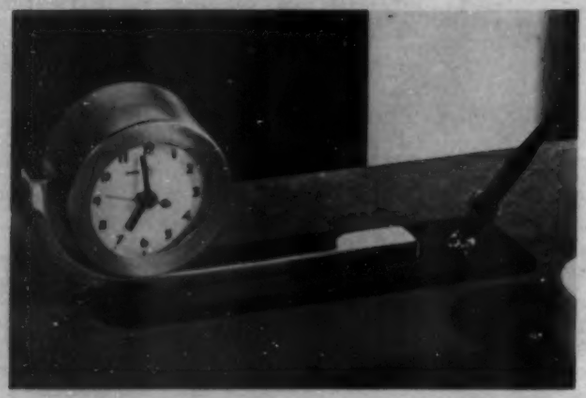
ARTHUR COLTON CO.

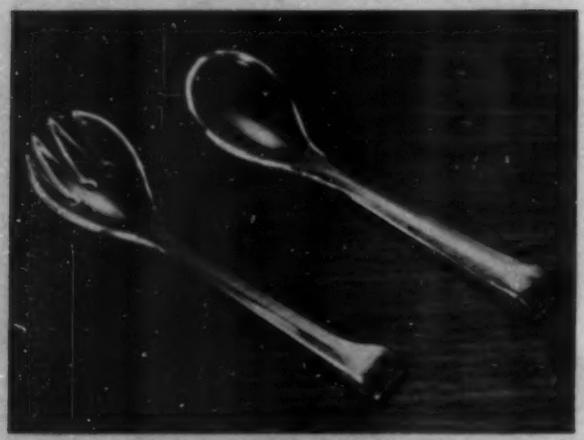
2604 E. JEFFERSON AVENUE

DETROIT, MICHIGAN

The new improved 5½ tablet machine—in every particular the finest the market has to offer. Solid steel frame insures perfect operation; improved die fasteners, improved cam construction, heavier ejecting mechanism, vanadium steel plungers—make high speeds possible without fear of breakdown or lowered quality. Makes tablets up to 3" in dia. having a fill depth up to 2½".

COLTON DETROIT





DECORATION AND DESIGN

(*Continued from page 33*) Other new decorative items in this medium are coat hangers, curtain rings and accessories. The coat hangers come in clear crystal color and in a range of seventeen lustrous shades. Designed to fit different needs of the wardrobe, these hangers include styles with curved up ends to hold evening gowns and lingerie holders with notches to prevent shoulder straps from slipping off. As the plastic material is unshatterable, these hangers will not chip or become shabby looking. Transparent curtain rings of this material made in the same range of colors answer the homemaker's quest for "something new" for window treatments.

Matching plastic rods may be had to complete the ensemble. Other transparent plastic rings have been adapted to form supports for a little table used for serving cocktails or as a holder for plants or flowers. The rings are easily detached and the equipment may be stored away flat when not in use. The table or tray part is a flat piece of solid color plastic. This shows the pleasant result of combining different kinds of plastic materials.

Now for another answer to the ever present cry of the consumer for something new: hand-carved figurines made of methyl methacrylate. These charming little figures were designed by Don Manning, well known American sculptor and are executed by skilled craftsmen. Representing animals, birds, homo sapiens gently caricatured, they are whimsical and full of spirit. In these figures, two forms of the plastic are used to enhance the decorative effect—the clear and the frosted. In the Röhm & Haas permanent exhibit at the new Radio City headquarters of PEDAC, knives, forks, ice and sugar tongs, muddlers, salad mixing sets, jewelry, etc., manufactured of transparent colorless methyl methacrylate, are on display. Unbreakable, lighter in weight than ordinary glass, the brilliantly clear plastic is practical as well as distinctive in styling and execution.

Just now, in New York, the artist Jane Ross is showing her first hand painted screen made of transparent cellulose acetate plastic. This is a stunning three fold iris screen done in oils in soft realistic colors. Because of the translucent quality of the plastic, the effect is like mellow stained glass, rich and highly decorative. Many variations of light and (*Please turn to next page*)

Photograph at the top shows the new Bell Telephone unit complete in a single plastic case on which the handset rests. The Herman Miller clock has a pen and base of black Bakelite designed by Gilbert Rohde. The salad tools and ice tongs picture the most recent use of transparent Plexiglas and made their appearance for the first time at the opening of Röhm & Haas Company's permanent exhibit at PEDAC Galleries, Radio City

In Next Month's MODERN PLASTICS Will Be Announced

The 4th ANNUAL MODERN PLASTICS COMPETITION

With Complete Details and OFFICIAL ENTRY BLANK

Each year—during the past three—the ANNUAL MODERN PLASTICS COMPETITION, sponsored by MODERN PLASTICS magazine, has achieved for its winners broad national prestige, recognition and publicity.

The 1939 Competition promises to be even more significant, more representative and more enthusiastic than ever before. One need only consider the great technical advances in plastics manufacture and the ever-increasing public acceptance and appreciation of plastics in all phases of everyday life.

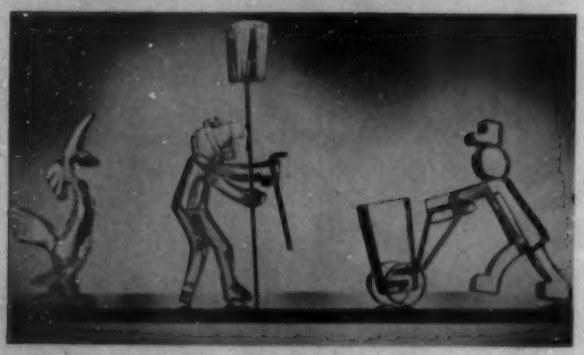
We suggest you make plans now to enter the Competition by setting aside samples of work of which you are especially proud and which, in your judgment, represent definite advances in either technique, design or application.

Be sure to get your Official Entry Blank and the full details in next month's MODERN PLASTICS.

If you are not as yet a regular, every month subscriber—or if your present subscription expires with the current issue—we invite you to fill in and mail the detachable reply card next to this page. Thus you will make sure of receiving your copy, as well as the interesting and significant issues in the months to come—including the October Directory Issue.

MODERN PLASTICS

Chanin Building, 122 E. 42nd St., New York, N. Y.



(*Continued from page 64*) shade are effected. This, of course, is not a mass production item, but one which has great possibilities for a limited editions market. Miss Ross is well known for her work with this type of plastic, having made several series of table mats in various motifs, two of the most charming being in Mexican and white lily designs. These mats are easily kept fresh with a damp cloth and are highly decorative.

Another purely decorative aspect of this plastic is the way it has been used in the manufacture of artificial flowers, particularly dogwood. The flowers come in realistic white and in a range of colors. The plastic petals are durable and may be washed when soiled. The wire stems are wound with paper and covered with an overlay of clear transparent cellulose film.

Cora Scovil, noted designer, has found another interesting use for cellulose acetate plastic. She finds it particularly well suited to the circles and triangles of a backgammon board with its modern pattern effect.

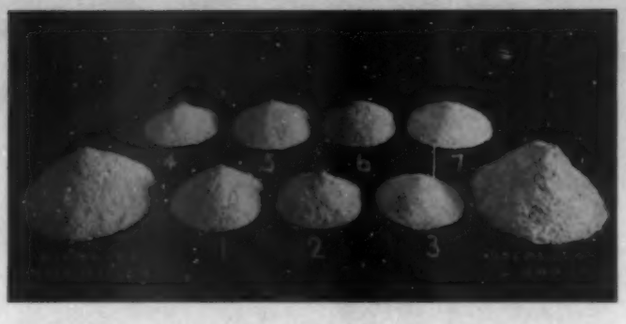
By the use of this plastic material the efficient housekeeper can keep linen closets looking more attractive and at the same time protect table cloths, towels, blankets, etc., from ever present dust. Transparent cellulose acetate plastic boxes in all sizes and shapes are moisture-proof and can be kept clean with a damp cloth.

Clocks, of course, have long been a medium for the use of plastics. Now with the improved color ranges and the possibilities of combining several different kinds of plastic materials, perhaps we shall see some interesting new developments in this direction.

Since this article has concentrated on the use of plastics in the home, perhaps it is permissible to mention that wonder train which is "home" to so many travellers. In the Twentieth Century Limited, designed by Henry Dreyfuss, plastics are used extensively as is well known. A few interesting applications are the alcohol and burn-proof table tops in the bar lounge and the walls of dark gray plastic on the vestibule of this lounge. To add to the decorative effect, shadow boxes have been placed, one on each wall, showing models of the De Witt Clinton and the famous 999, two of the New York Central's best known railway engines.

Great strides have been made in the development of plastics in the allied fields of decoration. That this progress can extend even further is no idle wish. New products, new colors, new methods, new lamps for old can be achieved by the unceasing cooperation of designer, architect, plastics producer and molder.

Hand painted table mats of transparent Plastacele provide a modern setting for a gala occasion. Designed by Jane Ross, the mats are decorated with white lilies and may be cleaned easily with a damp cloth. Joseph H. Meyers Bros. turned out the little cocktail table in the center. Lucite rings support the sheet of opaque coral plastic which serves as a top and they may be slipped off for storage or shipping. Whimsical figurines such as those at the left are shaped from Lucite by Don Manning



GREATER BULKING is but one of the many qualities of DICALITE FILLERS. Compare the bulking (or volume) of the two DICALITE FILLERS above with the seven ordinary fillers. One pound of filler is in each pile.

Have you tried DICALITE FILLERS in *your* PLASTICS?

YOU get several distinctive advantages in your plastics—molded or cast—when you use DICALITE FILLERS: such as:

Greater bulking

Increased strength of finished products

Uniform dispersion

Better color qualities

Improved heat resistance

Better fire resistance

Lower cost per unit of finished plastics

Uniform quality—DICALITE FILLERS are always uniform bag to bag

We invite you to try DICALITE FILLERS in your plastics. Write for complete information and specific recommendations on the use of these high quality mineral fillers.

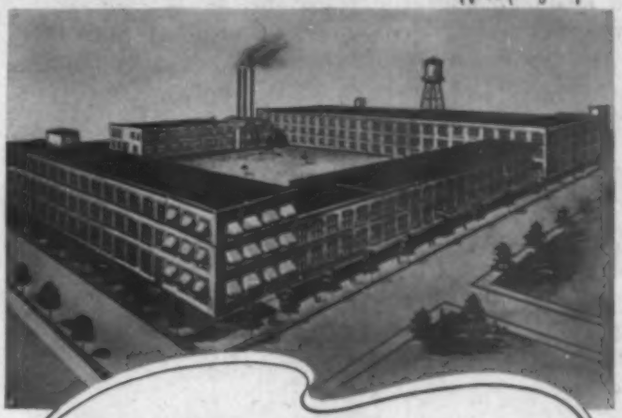
THE DICALITE COMPANY

520 N. Michigan Ave. CHICAGO · 120 Wall St. NEW YORK · 756 S. Broadway LOS ANGELES

PRODUCTS OF UNIFORM SUPERIOR PERFORMANCE

GENERAL U. S. GRANT "CARRIED THROUGH"

General Grant is not remembered for the dash and brilliancy that distinguished many other leaders of his time; but his military training was thorough and he had the tenacity and resolution to carry the job through to completion. His fame as a soldier carried him through to the Presidency.



GENERAL INDUSTRIES

Carries Through on any Molded Plastic Job

When you select a source of supply, you want a plastics molder who can carry through for you—and this General Industries is fully prepared to do—to the very end. General Industries is prepared to handle a job of any size, of any specification, and to make deliveries on any time within reason.

General Industries' plant is large and modern, staffed by competent engineers, equipped with the most efficient machinery. All operations are under one roof, under one direction, from making the molds to providing metal inserts where required.

You incur no obligation by inviting us to bid on your next job.

GENERAL INDUSTRIES CO.

Molded Plastics Division

OLIVE AND TAYLOR STREETS · ELYRIA, OHIO

CHICAGO HAS NEW PLANT

(*Continued from page 35*) room, the surface grinders are grouped in a radial fashion, each with an individual dust-collecting conduit, leading to a central conduit.

With a personnel of about 100 men engaged in the design and fabrication of molds, due emphasis is placed upon mold construction. Aside from the manufacture of molds and their hobs, the tool room provides accessories for maintaining efficient production schedules. Included in these are the preforming dies, drill jigs, loading fixtures, inspection gages, cooling and heating plates, etc.

Molding Department

The molding room, occupying the western part of the building is 150 ft. by 80 ft., and 22 ft. in height. The high ceiling is a noteworthy feature, permitting ready removal of heat radiated from the molds and presses, and some of the gases given off during the molding operation. Nine 48 in. roof ventilators over the molding room facilitate proper ventilation.

Approximately 100 presses, ranging in capacity from 50 to 550 tons fulfill the requirements of the molding room. The presses are widely spaced from one another, a decided contrast to the old molding plant, where the continuous addition of new equipment necessitated very narrow spacings between individual units. The larger capacity presses are concentrated at the north end of the molding room, nearest to the power plant. At the far south end, a battery of injection molding machines has been placed. Outstanding among these is a 12 oz. capacity injection molding (*Please turn to next page*)

Tumbling barrels are mounted in pairs (Fig. 8) for finishing operations on small molded parts. Fig. 9 shows a preforming machine totally enclosed with glass viewing panel. Fig. 10 gives an idea of the storage room required for raw materials. Fig. 11—Inactive molds are stored for instant removal for renewed operation when required

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LEAROK

The Clean Buffing Compound

LEAROK has no "free grease" in it. It is clean. It doesn't get into crevices and ornamentations. This, coupled with its excellent buffing properties, make it ideal for finishing plastics. LEAROK can be obtained tinted to match the color of the finished article.

Send a sample of your work for our recommendations.

The Lea Mfg. Co.
Waterbury, Conn.

Specialists in the Production of Clean-Working Buffing and Polishing Compounds

GRIND 200 Lbs. OF SCRAP PER HOUR with the RAPID PLASTIC GRANULATING MACHINE!

Or use its smaller size and get 100 lbs. per hour! Simple in design, rugged in construction, these machines render efficient service for years on end. Best alloy steel is used for their blades and cutters. Spindles are made of high tensile alloy steel, hardened and ground, and mounted on Timken Roller Bearings.

Each machine comes with two different sized screens, 3/8" and 3/4", interchangeable in two minutes . . . . and with underneath chute to carry granulated plastic to basket.

Investigate these money-saving machines now. Write for folder and full information.

LEOMINSTER TOOL CO., Inc.
272 Whitney St. Leominster, Mass.
Mfrs. of complete line of equipment for Catalin, Celluloid and Plastic Molding AND EXTRUSION MOLDING DIES.

BUT IT'S THE KIND WE CAN LICK AT AUBURN

Jobs, like the socket illustrated at top and in cross-section, molded in one piece with undercut inside "L" shaped slots, threaded base and screw inserts, are tough ones to hand any molder. But, here at Auburn, they are the kind we take real pride in licking. They give us a chance to apply the knowledge we have acquired through more than 60 years of pioneering experience. They prove, also, the value of the many inspections that we make at every step of the work.

The next time you have a tough job on the docket and want it done right, at a reasonable price, and delivered on time, why not turn the specifications over to Auburn.

Established 1876

MOLDED PLASTICS DIVISION OF
AUBURN BUTTON WORKS, Inc.
AUBURN, N. Y.

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machine, which unit represents a new addition to the plant equipment. Besides, there are several new additions among the conventional compression molding equipment, with press capacities of 200, 300, and 500 tons.

High pressure and low pressure hydraulic lines and return steam line are passed underground, though this piping is readily accessible, by lifting large steel panels which cover the piping, and are flush with the floor. Air lines, cold water, and live steam for the molds and plattens are furnished in overhead piping. Small preheating ovens are placed about the molding room where needed, since there is adequate space beside or in front of the presses. For light colored urea or acetate molding operations, clean, white cloths are draped about individual presses, segregating these from other presses.

An immediate feature that catches the eye about the molding room is that each press is individually located in a separate pit in the concrete floor. This brings the level of the platten nearer to the height of the operator, without the customary wooden platforms in front of the presses. This fact contributes to the safety of the operator and speed of the molding cycle. Also, to lessen foot fatigue and add to the comfort of the operator, a square of wooden blocks, ends faced upward, are set into the concrete floor before each press. The question of comfort for the workers was given major consideration at the time of planning the new plant. Such an attitude is bound to reap increased dividends through the cooperative spirit of the workers.

Set aside in one small section of the molding department is a darkened room in which are filed the achievements of the company. Rows upon rows of molds are piled high, each mold having con- (*Please turn to next page*)

Ten holes are being drilled simultaneously in this radio cabinet (Fig. 12). Most important in all engineering endeavors is the drafting room (Fig. 13) where molds and accessories are designed. Dust collectors convey all dust and dirt away from buffing wheels (Fig. 14) to insure cleanliness. Rough finishing is done with hand grinding tools (Fig. 15) motor driven by flexible shafts. Sanding wheels are also used. Finally, comes inspection (Fig. 16) where all parts are carefully checked and inspected prior to packing and sending them on their merry way

YOU SHOULD **REALIZE** THAT

STEADY-UNIFORM—injection plunger travel results in stronger injection molded parts—minimizing flow lines, stress lines and laminations.

RAPID INJECTION—results in material entering the mold before material chills and sets giving uniform structure.

HIGH INJECTION PRESSURE—results in greater molded density.

GAIN these with **GROTELITE TRI-PUMP SYSTEM**

INJECTION PLUNGER—225 inches per min.

CUBIC DISPLACEMENT of material at 26,000 pounds pressure per square inch is 480 cubic inches per minute.

PUMP CAPACITY—over 60 gals. per min. during *entire* injection piston stroke. Power consumption during most of molding cycle 5 H.P.

GROTELITE Write for details
THE GROTELITE COMPANY
BELLEVUE, KY. OPPOSITE CINCINNATI

PLASTIC MOLDS

Since 1918 leading molders have recognized this firm as the outstanding specialists in the manufacturing of molds for plastic materials, in die-sinking, engraving and hydraulic hobbing.

Our plant is Keller, Gorton & Blanchard equipped for the most economical and speedy production of superior molds.

Place your problems in the hands of this experienced, well recognized and financially responsible concern.

NOCD
NEWARK DIE COMPANY, Inc.
22-24 SCOTT STREET, NEWARK, N. J.
TELEPHONE MARKET 2-3772
2-3773

Here's INTRICATE Injection Molding

Keen minded engineers will appreciate these SINKO achievements in injection molding.

1. Delicate color "Tenite" gears with close limits.
2. Transparent acetate over die-casting.
3. .025 full depth radial chambers in wall.
4. Perfect running as to correlativity.

These are but samples of the numerous injection molded parts we make. Our modern tool room and a large metal stamping department are coordinated with our plastic division. Call on us for full particulars.

SINKO TOOL & MFG. CO.
Injection Molders
361 North Crawford Ave. Chicago, Ill.
Kedzie 5880

LETTER
DECORATE
TRADEMARK
PLASTICS
IN YOUR OWN FACTORY
BY THE NEW, ECONOMICAL
MARKEM METHOD
No heated equipment or drying ovens required.
By developing special inks and special equipment, we have met the plastic industry's demands for practical machines and chemical inks for printing on plastic surfaces.
The MARKEM method is simple and low in cost. Printing can be done on curved or flat surfaces . . . and at speeds that guarantee top-most efficiency.
Behind the system is a firm that for over 27 years has specialized in developing printing and marking methods for unusual materials.
Let us show you how . . . and how much . . . you can benefit by using this system.
MARKEM MACHINE CO.
KEENE, NEW HAMPSHIRE

YARWAY
HYDRAULIC VALVE
GREATER EASE AND FLEXIBILITY OF CONTROL
THE HIGHER THE PRESSURE THE TIGHTER THE VALVE
AUTOMATICALLY REGRINDS OWN SEALING SURFACES
LONG TROUBLE-FREE LIFE LOW MAINTENANCE
QUARTER CENTURY OF SUCCESSFUL USE
Made in straightway, three-way and four-way types — Write for Bulletin H-2-C
YARNALL-WARING COMPANY
106 MERMAID AVENUE PHILA., PA.

tributed to the growth of the plastics industry, and what is even more important, each mold is capable of being placed in service again upon short notice.

Finishing Operations

Following the path from the molding department, the molded parts may undergo one or more of the following operations. In the drilling room, multiple-spindle drilling machines are engaged in drilling side holes on miscellaneous molded pieces. As many as 10 holes can be drilled simultaneously in some large radio cabinets.

Small parts may be put into tumbling barrels, which are placed in pairs, one above another, to minimize floor space. On many small molded pieces, the tumbling operations will suffice in removing flash. For larger parts, removal of fins is accomplished by light filing operations, followed by buffing and polishing. In accordance with the best practices of the finishing department, dust collecting conduits are available at each buffing wheel, maintaining the air clean and fresh at all times.

Directly connected to the finishing department is the final inspection, followed in turn by the packing and shipping departments. After the finishing operations, parts are subjected to a rigorous inspection for quality as well as accuracy.

Power Plant

Examination of the power plant at the north end of the molding department reveals up-to-date equipment. The low pressure—high pressure hydraulic system prevails for operating the presses, 500 pounds being maintained for closing the platten, and 2500 to 3000 lbs. per square inch available for building up the molding pressures. The low pressure accumulator, a new acquisition, replaces a low pressure pump formerly used at the old plant, once again indicating that modernization of equipment is of prime concern.

Live steam at 160–175 pounds per square inch, available for heating the molds and the platten, is supplied from the boiler in the power plant. Floor space is available in the power plant for the addition of another boiler and duplication of the pumping facilities if the occasion should arise. Located at the north-west end of the building the power plant also has access to the railroad siding, and hence fuel supply for the boiler.

Employee Welfare

The executives of the organization stress the importance of employee welfare. An average payroll of 450 employees receives the benefit of this far-sighted policy. Throughout the plant, this belief is manifested in numerous ways. Northern light for the tool room and drafting room; high ceilings and efficient dust collecting systems throughout the plant; wooden blocks set in the concrete floor to lessen fatigue for employees who remain on their feet a good portion of the day; a large recreation room on the ground floor for the convenience of the employees; and in many other ways, this organization has put into action its belief in employee welfare.

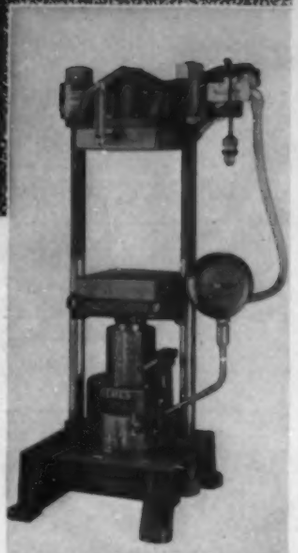
After visiting the various departments, one gathers the

CONSTANT PRESSURE

with this

ELMES

Hydraulic Laboratory Press



Here's an important development in laboratory presses—a new hydraulic unit which maintains pressure on the work without any further attention from the operator.

Adaptable for a wide variety of experimental work and small scale tests. Results accurate when translated into terms of larger presses.

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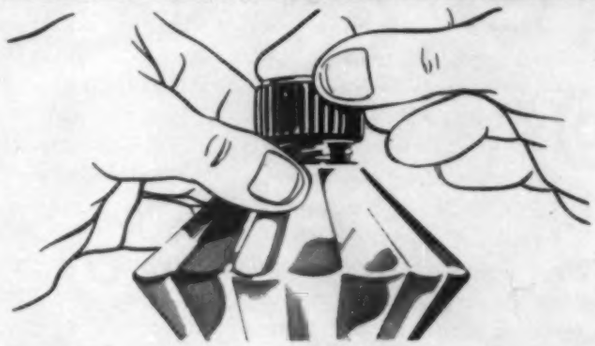

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impression that the flow of material throughout the plant proceeds in a very efficient manner, with each department following one another in a logical sequence. Long years of experience have shown that planned layouts of this type result ultimately in benefits to the customers through higher quality at lower costs. In transferring to its new headquarters, the Chicago Molded Products Corp. was afforded an opportunity to retire obsolete equipment and introduce new equipment. An estimate of approximately 20 percent increase in plant equipment over the former Walnut Street plant, is indicated by the organization.

Aware that the plastics industry has by no means shown signs of reaching a peak in its progress, this organization has provided for still further expansion, as business warrants. There are available another 35,000 sq. ft. for the factory, while within the plant proper, space can be made available for other equipments.

TRANSFER MOLDING

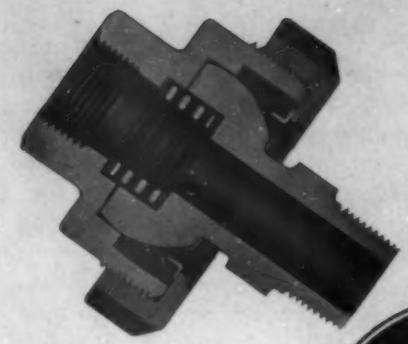
(*Continued from page 31*) Due to the fact that the molding material is rapidly heated in thin sections before entering the mold cavity, the molding cycle is substantially shortened, frequently as much as fifty percent.

Regardless of the number of mold cavities, only one charge of material is required, thus the time expended in filling each individual cavity is saved. Due to the fact that the preheated material flows into the mold in ductile condition and at very low pressure, there are no surges, caused by high pressures, to displace or distort fragile cores or inserts. Many products with delicate glass inserts have been successfully molded in large volume.

As the mold cavity is closed at the time the preplasticized material enters, it is obvious that the finished product will be of absolute dimensional accuracy and have uniform strength and quality through its entire structure; also, that flash or fins are entirely eliminated, this resulting in lower finishing costs. Because molding material is preheated and softened before entering mold cavity, abrasion of the polished surface of the mold, caused by preforms or hard compound, is reduced to a minimum. This does away with the necessity for buffing with the attending danger of exposing the filler underneath the pure resin skin of the molded article.

Gases and occluded air within the molding compound are dispelled in the preheating chamber, the result being complete elimination of losses due to blisters or flow marks. The primary advantages of transfer molding may be summed up as follows: Improved quality—ability to mold intricate shapes that cannot be produced by any other known method—extreme accuracy in location of inserts—reduction of molding cycle—substantially lower finishing costs—elimination or substantial reduction of rejects.

The benefits afforded by transfer molding are so obvious and have been so clearly demonstrated by mass production that the rapidly increasing interest in the process is readily understandable.



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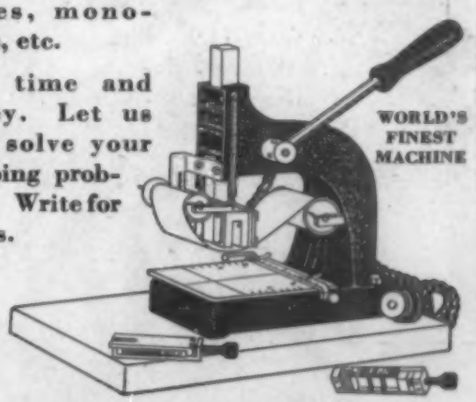

KINGSLEY GOLD STAMPING MACHINE CO.
HOLLYWOOD, CALIFORNIA

AUTOMOBILES OF 1939

(*Continued from page 25*)

Overland uses plastics in control knobs and small handle on glove compartment door.

General Motors makes generous use of plastic materials in conventional applications. The robe rail in the Oldsmobile has plastic escutcheons besides. Olds, Pontiac, La Salle and Cadillac are equipped with plastic steering wheels for safety and appearance.

In the present Buick the safety directional signals—"Flash-way" to 1939 Buick owners—are of transparent methyl methacrylate. The horn disk emblem is of like material. The modernistic Chevrolet glass-like radiator emblem is also molded methyl methacrylate.

With each new model year the industry finds many new uses for plastics. It is difficult to accurately measure year by year the development in pounds or dollars. In 1938 only one major manufacturer used a molded instrument panel. In the 1939 models there were three. In 1938 some cars continued with metal hardware; in 1939 nearly all had turned to plastics.

With but few exceptions all manufacturers in 1939 have included as either standard equipment or as an accessory, safety type plastic steering wheels.

What part plastics are to play in building the automobile of tomorrow is open to broad discussion and fantastic conjecture. Window frames are a near reality—plastic fenders have felt the authority of the drawing boards. When the body itself will be measured and the molds designed doesn't seem so far removed.

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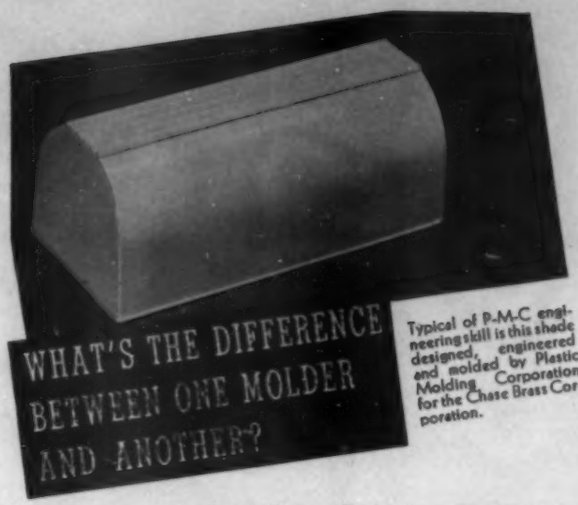
PLASTICS AT BALTIMORE A.C.S. MEETING

(*Continued from page 45*) simulating the dull calf and patent leather used in the pocketbook industry, while non-tarnishing metallized finishes have opened new markets in the lower priced evening slipper field, for which genuine gold and "silver" kid have formerly been employed in the more expensive articles. Suitable coatings also have made possible washable window shade material while use of synthetic products in bookbinding material have resulted in certain advantages in bindery manufacture not previously attainable. Synthetic coating compositions have resulted in new types of products such as cleanable adhesive tape and also coated collar interliner possessing satisfactory resistance to laundering treatments.

SYNTHETIC MATERIALS AS WIRE INSULATION. *Winton Patnode.* The insulation of the chief types of conductors for the transmission, distribution, and utilization of electric power, and recent advances in such insulation employing synthetic resinous or rubber-like materials were discussed. Particular emphasis was placed upon *magnet wire*, which is defined as wire generally used in the form of coils for interchange of electric and magnetic energy. A detailed description of a new magnet wire insulated with synthetic resins was included.

THE POLYHYDRIC ALCOHOL-POLYBASIC ACID REACTION. III. FURTHER STUDIES OF THE GLYCEROL-PHTHALIC ANHYDRIDE REACTION. *R. H. Kienle, P. A. van der Meulen, and F. E. Petke.* Since the appearance of the first paper of this series, several papers have appeared on the glyceryl-phthalate reaction. It was therefore decided to re-investigate the reaction with very pure ingredients and under carefully controlled conditions, all in a special apparatus which allowed reproducible results to be obtained and the products evolved to be continuously collected. When carried out in this manner at 200° C., it was shown that the water evolved was greater than cal-



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culated from simple inter-esterification considerations. When the acid value was investigated as a function of time, breaks appeared if a log-log plot was made. These breaks suggested that the reaction proceeded essentially in four stages to gelation. Samples were prepared representative of the progress of the reaction and their acid value, saponification value, ultimate analysis, and molecular weight determined. A schematic progress of the reaction was suggested based essentially on inter-esterification but modified by assuming some intra-esterification and anhydride formation. Suggested compositions for resins at various stages of the reaction have been worked out, the calculated average properties of which have been found to be in good agreement with the experimentally determined values. The postulated progress agrees with the infra-red spectra, rheological properties, spreading characteristics of monomolecular films of the various stages and with the fractionation studies. The data suggest that gelation occurs not with the formation of large macromolecules, but after a sufficient molar concentration of small but complicated three-dimensional molecules is attained, thus inducing arrested motion. The major portion of these gelation producing molecules appear to be on the average not much greater than tetramers.

REACTION OF MALEIC ANHYDRIDE WITH COMMERCIAL ABIETIC ACID (ROSIN). *A. G. Hovey and T. S. Hodgins.* Comparison is made of results, using commercial abietic acid (rosin) instead of the very pure precipitated abietic acid used by Ruzicka, Fieser and Campbell, and others, in their study of the structure of abietic acid and of the addition products formed by maleic anhydride with abietic acid. Although the existing theoretical data which is in abundance by these workers is very valuable, industrial operations have to be carried out with the abietic acid that is commercially available, i.e., rosin. Much of the theoretical work previously done has been performed on freshly prepared abietic acid on which no oxidation has taken place if it could possibly be prevented. Furthermore, industry often has to use rosin that may have undergone a certain amount of oxidation. In the experimental part, the progress of the reaction of maleic anhydride with rosin at 230° C. has been studied, using acid number, melting point, and saponification number as indicators to denote the extent of reaction. The samples taken out during the run have been dissolved in benzene, extracted with water, and then the free maleic anhydride determined, as well as the redetermination of the acid number, saponification number, and melting point on the re-extracted samples. The progress of the reaction under isothermic conditions at 230° C. was also followed. A molecular weight and a carbon and hydrogen determination are reported for the final product. The result shows an average molecular weight and a carbon and hydrogen analysis comparable with the value calculated for the theoretical formula, $C_{24}H_{32}O_5$, i.e.; the maleic anhydride-abietic acid addition product. The question as to the function of conjugated double bonds is discussed in view of Ruzicka's contention that abietic acid is also in equilibrium with *d*-pimaric acid.

MOLECULAR MEASUREMENTS OF SOLID LIQUIDS. *H. L. Bender.* The cybotactic theory of the liquid state, as advocated by Stewart, is applied to the super-cooled liquid state of resinous material. Evidence is sought for changing structural particles in a semi-permanent condition as predicted by the condition of cybotaxis in a super-cooled liquid state. The resinous condition of phenol-formaldehyde fusible condensation products is used as principal reference data. The viscosity effects of solid polymers placed in liquid solvents are shown by literature references and by experimental data to be unstable. The measurable viscosity effect of polymers in solution is shown to be dependent upon the conditions used to produce the solution in any one solvent. It is dependent upon choice of solvent, upon energy factors and time factors. The determined molecular weight numbers of a resin in solvent are shown to be changing quantities with temporary equilibrium numerical values shifting many fold as conditions change. Any molecular weight number determined for resins is defined as an arbitrary number and considered as a cybotactic particle value, the magnitude of which value is dependent upon the conditions under which the analytical determinations are made. These measurements of actual cybotactic particles in the resinous state change slowly in this super-cooled liquid condition. The data obtained is thus in line with the expectations of the cybotactic theory and contrary to the expectations of the chain molecular theory.